

MICHIGAN

STATE

UNIVERSITY

OAKLAND

CURRICULUM

MAY 22, 1959

CURRICULUM

MICHIGAN STATE UNIVERSITY-OAKLAND

May 22, 1959

Introductory Comments

In January of 1957, Mr. and Mrs. Alfred G. Wilson announced the gift of their beautiful 1400-acre estate (Meadowbrook) in Oakland County, Michigan, plus \$2 million, to Michigan State University for the purpose of establishing a new university in the area. In addition to the 1400 acres, the estate consists of Meadowbrook Hall, one of the world's fine residences; the modern, smaller home of the Wilsons (Sunset Terrace); plus several other residences and farm buildings. The \$2 million was for the purpose of constructing the first academic buildings for the new university.

Prior to this gift, Dr. Sarah Van Hoosen Jones had given the University 350 acres of land in Oakland County, located five miles northeast of Meadowbrook. Following the Wilson gift, the University has acquired an additional 200 acres immediately adjacent to the Wilson property.

In total, then, Michigan State University now owns almost 2000 acres of land in Oakland County, plus several buildings, and now has under construction the first buildings on this new campus.

The Meadowbrook Estate is located in the eastern part of Oakland County, near the Macomb County line. In relation to existing population centers, it is three miles east of Pontiac (population 80,000), three miles west of Rochester (population 5,000), and 25 miles north of Detroit.

The great potential of this new development is indicated in the population figures of the area. The combined population of Macomb and Oakland Counties is currently in excess of one million, and it is predicted conservatively that by 1980 this combined figure will reach two million. More specifically, it has been determined that in 1959 approximately 50,000 young men and women between the ages of 18 and 24 live within 15 miles of this new campus; and it is predicted that this figure will exceed 100,000 by 1970.

Further evidence of the staggering potential of this area is found in the fact that there is not now a single post-high-school educational institution, public or private, in either county--except for a new community college in south Macomb County.

Adding to this potential in another dimension is the highly advantageous location of the top research headquarters of the automotive industry. Twelve miles away is the new General Motors Technical Center; less than three miles away is the new site for Chrysler's proposed center for research; and Ford's new proving grounds and testing center is about 12 miles distant.

In accepting the Wilson gift, President John A. Hannah of Michigan State University announced the appointment of a committee of 50 community leaders from the two counties to assist in developing the new university along the most productive possible lines.

This committee has subsequently been incorporated into the Michigan State University-Oakland Foundation and will serve in a permanent advisory and supporting role to the official governing board of Michigan State University and Michigan State University-Oakland. (A list of the members of the Michigan State University-Oakland Foundation may be found at the back of this booklet.)

Many important recommendations have been made by the Foundation, and they have all been accepted by the Board of Trustees of Michigan State University. Included among the recommendations are these:

1. That Michigan State University-Oakland be developed as a first-class four-year undergraduate institution, with the possibility of graduate work developing at the earliest practicable date.
2. That Michigan State University-Oakland open in the fall of 1959 for a freshman class only.
3. That degree programs be offered in four areas: Liberal Arts, Business Administration, Teacher Education, and Engineering Science.

4. That this new university have a high degree of administrative autonomy, free to develop its own program, recruit its own faculty, and establish its own identity.
5. That there be a substantial program in Adult or Continuing Education, with particular emphasis upon evening and Saturday classes.

The Foundation is operating with an Executive Board (the seven officers) and four major committees. These committees are:

1. Program Development Committee, chaired by Mr. James C. Zeder, Vice President, Chrysler Corporation
2. Continuing Education Committee, chaired by Mrs. Elizabeth H. Gossett, a prominent civic leader in the community
3. Community Relations Committee, chaired by Dr. Paul K. Cousino, Superintendent, Warren Public Schools
4. Finance Committee, chaired by Mr. Don E. Ahrens, retired Vice President, General Motors Corporation

One of the major contributions of the Michigan State University-Oakland Foundation to date has been its enthusiastic leadership in developing the curriculum for this new university. This has been a dramatic example of the involvement of community leaders, nationally-known lay leaders in the field of higher education, educational statesmen, and educational administrators in the formulation of a promising new program.

The pages which follow describe in some detail the product of these endeavors.

MICHIGAN STATE UNIVERSITY-OAKLAND

PURPOSES

The primary purpose of a university is to encourage the maximum possible intellectual development of each student.

This is not to imply that other values--morality, citizenship, personality--are not important or shall be ignored by a university, but a student entering a university without the knowledge of what constitutes the primary objective of the institution starts with a handicap.

Each social institution exists to accomplish a purpose. Churches have their fundamental objectives in the realm of morality and religion, industries must produce goods, families must rear the young. Only colleges and universities have been established by society specifically to deal with the human capacity for learning at an advanced level. To forget this is to betray the trust of the society which supports our institutions of higher learning.

Of course, students do not live in a vacuum, and there are secondary learning experiences which not only support the primary, but which are important in themselves. Living and working with other students can teach much about man's historic endeavor to control himself and achieve desirable objectives through cooperation. The assumption of responsibility in student organizations can develop integrity. And most important in a public university is the realization by its students that the knowledge and skills which they acquire must be brought to the service of the people composing their society.

Stated another way, it is the university's obligation to assist each student to attain the knowledge and skills necessary to make him proficient as a professional, competent as a citizen, and happy as a human being; and all of this it must do in a context which never lets the student forget the words of a very wise scholar, "No man has a right to lead such a life of contemplation as to forget in his ease the service due to his neighbor."

THE CURRICULUM DEVELOPMENT PROCESS

The curriculum described in this statement is the product of four separate but related approaches to the problem.

Over a year ago a small group of faculty members from the East Lansing campus were brought together under the direction of Vice President Hamilton to serve as an MSUO curriculum committee. (See Appendix 1 for a list of the members of this committee.) This group spent many hours in developing a proposed curriculum and their work has been highly beneficial in subsequent discussions.

Following this, and completely independent of the curriculum committee's activities, was the work of the Zeder committee of the MSUO Foundation. (See Appendix 2 for a list of the members of this committee.) This group sponsored a seminar in each of the four program areas-Liberal Arts, Engineering Science, Teacher Education, and Business Administration. Participating in these meetings were some of America's most distinguished educators and citizens. They were invited to direct their thoughts to the opportunity of developing a totally new curriculum in a situation where there are relatively few of the traditional limitations. The seminar discussions have been summarized and are attached as Appendices 3, 4, 5, and 6.

During the past several weeks, the third phase of the curriculum development occurred on the East Lansing campus. Working with full knowledge of the curriculum committee report and the general recommendations of the several seminars, the Deans of the related colleges on the East Lansing campus brought together a small group of their own key personnel to suggest ways in which the various recommendations might be implemented.

The fourth phase of this development has been the work of a small group of young and vigorous Michigan State University faculty members serving as a working committee to spell out a specific curriculum. (See Appendix 7 for a list of this committee.)

SOME GENERAL GUIDE LINES IN THE CURRICULUM DEVELOPMENT

It is only natural that the involvement of more than two score individuals from many and diverse areas, professions, and points of view would produce something less than complete agreement. Nevertheless, it has been both interesting and gratifying to observe that certain major thoughts have had almost unanimous endorsement. Among these we can identify the following:

1. Modern university curricula are unnecessarily complex, both in terms of their course structure and the major areas of study. It was recommended, therefore, that in this new institution every effort should be made to develop a program which is relatively simple in terms of variety, but which places great emphasis on quality and depth.
2. Following naturally from the growing complexity of course offerings has come an unnecessary degree of specialization and vocationalization of courses and programs. It has been urged, therefore, that MSUO place a major emphasis upon the development of liberally educated students, regardless of the professional field chosen.
3. It would be desirable to sharply limit the number of courses which a student may take during any given quarter or term.
4. Present methods of classroom instruction should be carefully examined with the hope that more productive schemes could be devised for facilitating the learning process for the students. Again and again critical questions were raised about the traditional system of fixed lecture periods, followed by an examination, which if successfully passed, entitled one to the "stamp of approval." The notion was often expressed that this institution,

beginning as it is, should seek more effective ways to achieve the learning objectives and, if possible, with less dollar cost.

5. The students graduating from MSUO will move into a situation demanding a considerable knowledge of the world beyond Michigan and the United States. Therefore, it was urged repeatedly that programs should be developed which would promote a general understanding of the world community, and hopefully, would equip these graduates with the ability to deal with at least one foreign language. An understanding of the non-western world was described as crucial for the leadership of the next generation.
6. There was much criticism of the existing and traditional organization of subject matter areas. The recommendation was made that a serious effort be devoted to the integration of subject matter in areas where such integration would be productive, and that generally an effort should be made to establish meaningful relationships between the various course offerings.

FROM GUIDE LINES TO SPECIFICS

In an effort to translate the general guide lines described in the preceding section into a specific course of action, the following points have been accepted:

1. MSUO will consider as its first objective the establishment of a first-class, undergraduate program. This does not bar the possibility of graduate work at a later date, but rather establishes a clear-cut priority of effort.
2. In order that this institution may convert to a twelve-month operational program at the earliest possible date, it has been decided that the quarter system will be adopted.
3. During the freshman year the normal student load will be four courses. In the sophomore, junior, and senior years the load normally will be three five-credit courses, except for three additional three-credit courses which may be selected by the student during any three of the last nine quarters.
4. Physical education will not be required for any student, although physical education programs on an informal basis will be available and students will be encouraged to participate.
5. ROTC will not be offered.
6. There will not be a separate basic college but a substantial number of Liberal Studies courses will be expected of all students. These courses will constitute about half of the total curriculum and will be distributed over the entire four years, with a heavier concentration in the first two years.
7. The MSUO faculty will offer no course of a sub-collegiate character. It will be assumed that only those students will be admitted who have demonstrated in their high school record

that they have the proper training and ability to do college-level work.

Nevertheless, some students inadequately trained in one or more of the basic tools of learning will inevitably appear in every freshman class. An effort will be made to identify such students as early as possible in their college career, and for them the MSUO administration will make available high school courses taught by high school teachers recruited for this purpose. Those who take such courses will be required to pay \$15.00 per term per course. This fee should be adequate to defray the cost of instruction.

The faculty will place strong emphasis on writing in all courses, and the quality of a student's writing will be the concern of the entire faculty.

8. The faculty will be encouraged to explore new arrangements for improving the learning process. Rather than prescribe new procedures to be followed, great freedom will be afforded the faculty with the hope that ways may be devised for improving the teacher-student relationship and for accelerating and enriching the educational program. For example, it is expected that less reliance will be placed on the formal lecture and more on small group discussions and personal consultation. Similarly, students will be encouraged to do as much independent study as is productive, with a corresponding reduction in the more formal classroom situations.
9. In an effort to release dollars for faculty salaries, the use of technological devices will be encouraged where they

offer promise of improving the efficiency of the program. For example, careful explorations will be made in the use of closed circuit television, tape recordings, records, film strips, and moving pictures.

Finally, it should be made clear that much of the content of the courses listed will of necessity be determined by the faculty of the institution, and that changes will occur with considerable frequency in an effort to maintain a fresh approach to the educational problems of the period.

THE LIBERAL STUDIES PROGRAM
(required of all students)

The Liberal Studies program may be defined as those liberal arts courses indispensable to the education of every college graduate regardless of his major. This program--as described below--will constitute about one-half of the course work spread over a four-year period.

The Liberal Studies requirements are:

1. Three terms of History and Development of Western Civilization: the development of western civilization from Greek times to the present, embracing art, literature, philosophy, and religion.
2. Three terms of History and Philosophy of Science: the development of scientific and mathematical methods, philosophy, and knowledge from Greek times to the present. (One term for Engineering Science and Science majors.)
3. Six terms of either a modern foreign language or of mathematics. This will be an option for some students, but the choice of one or the other will be required in certain curricula. The foreign languages offered in the first year will be French and Russian, with a particular emphasis on the latter.
4. Three terms of Social Science: introductory courses in economics, political science, sociology and anthropology, and social psychology.
5. Three terms of Foreign Studies: area approach to contemporary non-western cultures, with especial attention to the Far East, the Mid-East, Africa, and Latin America. (Two terms for engineers.)
6. One term of Great Issues: a study of a few carefully selected major issues of paramount contemporary significance.

LIBERAL STUDIES FOR ALL STUDENTS

Freshman Year1st QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science*
or ChemistryForeign Language*
or Mathematics2nd QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science*
or ChemistryForeign Language*
or Mathematics3rd QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science*
or ChemistryForeign Language*
or MathematicsSophomore YearForeign Language
or MathematicsHistory & Philosophy
of ScienceForeign Language
or MathematicsHistory & Philosophy
of ScienceForeign Language
or MathematicsHistory & Philosophy*
of ScienceJunior Year

Foreign Studies

Foreign Studies

Foreign Studies

Senior Year

Great Issues

*Engineering Science and Science students will take Chemistry and Mathematics during the freshman year and Social Science during the sophomore year or as part of the electives available; they will take History and Philosophy of Science during the last quarter of the sophomore year. This will be a course especially designed for Science students.

(A summary of the seminar dealing with the subject of the Liberal Arts curriculum is attached as Appendix 3.) 13.

LIBERAL ARTS

The liberal arts subjects have their own importance and, at the same time, they are essential to the full development of men simply as educated citizens, whether they are to be teachers, businessmen, or engineers. In recent years the pressure on our universities has increased to produce the kind of graduate who has a broad liberal education; and this demand, which is rapidly becoming an expectation, has come from such differing voices as foreign service, scientific research agencies, and industrial management.

The curriculum developed here aims at the growth of the individual as a thinker, creator and mature participant in a democratic society. This is the broad commitment of the liberal arts: to produce young men and women with a substantial knowledge of their culture, including a sound understanding of the social and economic life of their society. Properly taught, the liberal arts have the capacity to foster such desirable qualities of mind as humility and sympathy. At the same time, they encourage an inquiring spirit and independence of thought.

By means of liberal arts study, students will learn to measure the value of their own and other societies. They will concern themselves with the controversies and issues which have preoccupied men and which have received cultural expression. An effort has been made to strike a proper balance in the curriculum, so that students will have a broadly based knowledge as well as knowledge in depth in special areas. This program is designed to provide students with the resources not only to serve society effectively, but to lead it as well.

LIBERAL ARTS

Freshman Year1st QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science
or ChemistryForeign Language
or Mathematics2nd QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science
or ChemistryForeign Language
or Mathematics3rd QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science
or ChemistryForeign Language
or MathematicsSophomore YearForeign Language
or MathematicsHistory & Philosophy
of Science

Major

Foreign Language
or MathematicsHistory & Philosophy
of Science

Major

Foreign Language
or MathematicsHistory & Philosophy
of Science

Major

Elective

Junior Year

Foreign Studies

Major

Elective

Foreign Studies

Major

Elective

Foreign Studies

Major

Elective

Elective

Senior Year

Elective

Major

Major

Elective

Major

Elective

Great Issues

Major

Elective

Elective

SCIENCE

Freshman Year1st Quarter

History and Development
of Western
Civilization

Composition and
Literature

Chemistry

Mathematics

2nd Quarter

History and Development
of Western
Civilization

Composition and
Literature

Chemistry

Mathematics

3rd Quarter

History and Development
of Western
Civilization

Composition and
Literature

Chemistry

Mathematics

Sophomore Year

Social Science

Major

Mathematics

Social Science

Major

Mathematics

History & Philosophy
of Science

Major

Mathematics

Social Science

Junior Year

Foreign Studies

Mathematics

Major

Foreign Studies

Mathematics

Major

Foreign Studies

Mathematics

Major

Elective

Senior Year

Elective

Major

Major

Elective

Major

Elective

Great Issues

Major

Elective

Elective

TEACHER EDUCATION

The development of an effective program for the preparation of teachers is to be a campus-wide responsibility at Michigan State University-Oakland. It is not likely that a separate administrative unit for this purpose shall be established in the near future, if at all.

Essential ingredients in a program for developing teachers for the public schools include: (1) a sound program in the liberal studies, reinforced by solid subject matter preparation in the teaching fields; (2) a knowledge of how children grow and learn; (3) an understanding of the functions of the school in the community setting; and (4) skill in handling the methods and materials of instruction. The curriculum described here has been designed with these purposes in mind.

More specifically, the curriculum proposes that all those studying for the teaching profession will take the following:

1. the program in the liberal studies,
2. a major and minor in the subjects which they will teach,
3. the psychology of human behavior, with special reference to child growth and learning,
4. the sociology of the school and community, with special reference to the nature of the community, the role of the school, and relationships between the two,
5. methods instruction in subjects to be taught, and
6. an internship in the public school.

It is hoped that in operation the teacher education program at Michigan State University-Oakland will develop a close and cooperative working relationship with the public schools of the community, and will be able to make substantial laboratory use of these schools for observation and internship.

TEACHER EDUCATION

Freshman Year1st QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science
or ChemistryForeign Language
or Mathematics2nd QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science
or ChemistryForeign Language
or Mathematics3rd QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science
or ChemistryForeign Language
or MathematicsSophomore YearHistory & Philosophy
of Science

Psychology

Foreign Language
or MathematicsHistory & Philosophy
of Science

Psychology

Foreign Language
or MathematicsHistory & Philosophy
of SciencePsychology
(Human Development)Foreign Language
or Mathematics

Internship

Junior Year

Sociology

Elective

Foreign Studies

Sociology

Internship

Foreign Studies

Sociology
(School & Community)Elementary School
Methods

Foreign Studies

Elective

Senior Year

Internship-Methods

Elective

Elective

Elementary School
Methods

Elective

Elective

Great Issues

Elective

Elective

Elective

BUSINESS ADMINISTRATION

Conceptually, there are five objectives to the business administration curriculum.

The first is that each student will be provided with that kind of educational experience which assures an educated and literate citizen. This objective will be satisfied through the commitment of approximately 50 percent of the curriculum to the liberal studies program described earlier.

The second objective is that of establishing a "bridge" between the liberal studies program and that designed to provide the educational basis for modern business leadership. In this "bridge" area there are studies of the American economy, managerial economics, legal and political environment of business, and consumer and purchase behavior.

The third objective is the building of a foundation for effective business administration. In this area the curriculum includes such topics as organization and executive behavior, market enterprise, fiscal administration, management of human resources, analysis of production systems, materials and product logistics, sales and cost forecasting, and business research methods.

Fourth, the curriculum provides an opportunity for the graduate to understand something of the broader implications of business leadership and the business community. To achieve this objective, the program provides courses as: social responsibilities of the businessman, concentration of economic power, international business, and great issues.

Finally, provision is made in the curriculum for devoting ten or more hours to a limited professional concentration in whatever area a student might choose from among those being offered.

Business Administration Course Concepts

Consumer and Purchase Behavior

Follows social science in a course to relate the student to the business world. This is fundamental to business in the sense that we have a consumer-oriented vs market-oriented economy.

Legal and Political Environment

Follows economics as another dimension within which business action takes place. Relates back to basic education in such areas as Roman and English common law, and replaces the traditional business law course.

Market Enterprise

Focuses on the external environment for business action; examines means by which firms grow and survive in competitive markets; and provides a market base for the designing of whole systems of business action.

Organization and Executive Behavior

Has to do with the internal environment of business. It will consider the organization as a social system and assess the role of the executive in this action setting.

Fiscal Administration

Combines the fields of finance and accounting which are so frequently undiscernible in business. Emphasis will not be on ledger entry accounting but on such topics as management aspects of operating statements, balance sheets, flow of funds through the enterprise and capital accounts.

Management of Human Resources

Assesses human resources in an integrated continuum. Designed to replace separate offerings such as personnel management, labor relations, and collective bargaining. The course will stress management considerations.

Analysis of Production Systems

Will consider various kinds of production systems such as process, job shop, and line production. While the course will treat production scheduling, control and related matters, these will be subservient to an understanding of the basic kinds of productive organizations and facilities.

Materials and Product Logistics

To consider materials procurement or purchasing and the physical distribution of goods--the transportation, warehousing, movement through transfer cities, and optimum location of outlets. This is an evolving area of business related to optimum movement of products and supplies through time and space, and this course will be designed to preserve the consistency of the basic view of the firm as an operating system.

Sales and Cost Forecasting

Will recognize forecasting as the basic tool of corporate planning and give consideration to the effect of forecast volumes in operating costs. This course will continue the accounting part of fiscal administration and will replace the traditional course in cost accounting.

Business Research Methods

This course recognizes that business problems increasingly will be solved through research and that the executive will be called upon to interpret research reports and pass judgment on findings. This will be built upon the scientific method established in the liberal studies program, using mathematics and statistics as tool subjects.

Social Responsibilities of the Businessman

Recognizing the corporation as one of the dominant social institutions of our times, this course will assess the role and requirements for enlightened corporate citizenship. It presupposes that if business fails in its social responsibilities, society will choose among the many alternatives in the area of social legislation.

Concentration of Economic Power

Designed to deal with the economic impact of power concentration, including business, labor, and government.

International Business

Recognizing the growing participation of American business in foreign settings, this course will deal with the subject from an administrative view seeking optimum programs for overseas opportunities. It will vary substantially from the more traditional courses in international trade taught from an economist's point of view.

Business Policy

This course will focus the student's attention during the last term on case problems from all areas of business. In this course, he will be expected to bring to bear his total accumulation of knowledge on action decisions of strategic importance to the firm.

BUSINESS ADMINISTRATION

Freshman Year1st QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science
or ChemistryForeign Language
or Mathematics2nd QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science
or ChemistryForeign Language
or Mathematics3rd QuarterHistory and Development
of Western
CivilizationComposition and
LiteratureSocial Science
or ChemistryForeign Language
or MathematicsSophomore YearHistory & Philosophy
of ScienceForeign Language
or Mathematics

The American Economy

History & Philosophy
of ScienceForeign Language
or Mathematics

Managerial Economics

History & Philosophy
of ScienceForeign Language
or MathematicsLegal & Political
Environment of Business

Elective*

Junior Year

Foreign Studies

Market Enterprise

Organization &
Executive Behavior

Foreign Studies

Fiscal Administration

Management of Human
Resources

Elective

Foreign Studies

Analysis of
Production SystemsMaterials & Product
Logistics

*The course in Consumer and Purchase Behavior will be recommended at this point, although it may be taken as an elective during any of the last nine terms.

BUSINESS ADMINISTRATION-continued

<u>Senior Year</u>		
<u>1st Quarter</u>	<u>2nd Quarter</u>	<u>3rd Quarter</u>
Sales & Cost Forecasting	Social Responsibilities of the Businessman	Great Issues
Business Research Methods	Concentration of Economic Power	Business Policy
Major Elective	International Business	Elective or Independent Study
	Elective	

(A summary of the seminar dealing with the subject of the Engineering Science curriculum is attached as Appendix 6.) 24.

ENGINEERING SCIENCE

The engineering science curriculum for Michigan State University-Oakland is a response to the needs of the modern world of science and technology for engineers who are broadly and scientifically educated. Departing from the traditional engineering curriculums and organizations, the program has been designed to fulfill the need for the engineer capable of employing the viewpoints and knowledge of physical science, who can take full advantage of the power of mathematics, and who has also received a breadth of training in cultural areas unusual in the engineering graduates of today.

The engineering program is primarily a three-year orientation to engineering science, followed by a year of specialized engineering application and terminating with a Bachelor of Science (Engineering Science) degree.

The technical work of the first two years is devoted to chemistry and physics. In the third year preliminary studies in the engineering field are undertaken. Appropriate work in mathematics continues during all three years. Topics in the social sciences and from the fields of the liberal studies will also be carried throughout the four years.

The specialized engineering work of the fourth year will build upon the earlier engineering sciences and will allow the student to begin to learn how to utilize his basic knowledge and mathematics in the study of engineering problems and the engineering methods applicable to their solution.

Students may choose engineering courses during the senior year from two major groups. One group will deal primarily with electronics, circuits, electromagnetics, and system studies. The second will include work in properties of materials, heat transfer, and mechanics.

ENGINEERING SCIENCE

Freshman Year1st Quarter

History and Development
of Western
Civilization

Composition and
Literature

Mathematics

Chemistry

2nd Quarter

History and Development
of Western
Civilization

Composition and
Literature

Mathematics

Chemistry

3rd Quarter

History and Development
of Western
Civilization

Composition and
Literature

Mathematics

Chemistry

Sophomore Year

Physics

Mathematics

Social Science

Physics

Mathematics

Social Science

Elective

Physics

Mathematics

History & Philosophy
of Science

Junior Year

Physics

Mathematics

Engineering

Foreign Studies

Mathematics

Engineering

Foreign Studies

Mathematics

Engineering

Elective

Senior Year

Engineering

Engineering

Engineering

Engineering

Engineering

Engineering

Great Issues

Engineering

Engineering

Elective

MATHEMATICS AT MICHIGAN STATE UNIVERSITY-OAKLAND

The mathematics program at Michigan State University-Oakland will be designed to accommodate two classes of students, engineering science students and students who elect to substitute mathematics for the foreign language requirement. It will therefore feature two two-year sequences which can be described briefly as follows.

The science sequence will be devoted mainly to the study of the calculus and its applications. This departs from the traditional program which begins with college algebra, but it is expected that the students entering this sequence will have had a thorough exposure to mathematics in high school.

The non-science sequence could well be labeled "an introduction to modern mathematics." It will be designed to help the students understand the aims and limitations of mathematics (and statistics) as well as some of the methods and applications. This, together with the course "The History and Philosophy of Science," should provide the student with an appreciation of the role of mathematics in our culture.

The non-science sequence is described in Table I, which follows, while the science sequence is shown in Table II.

TABLE I

MATHEMATICS CURRICULUM I
(Non-Science Majors)

Terms 1, 2, 3. Functions of a single variable. (A study of the elementary functions of a single variable through the methods of algebra, coordinate geometry, and calculus.)

1. Sets and functions, coordinate systems, and graphs.
2. Polynomial, rational, and algebraic functions.
3. Circular functions.
4. Logarithmic and exponential functions.

Term 4. Statistics.

1. Measurements and grouping of data.
2. Measures of central tendency and dispersion.
3. Sampling theory.
4. Tests of hypotheses.

Terms 5, 6. Probability theory and mathematical models.

1. Partitions of sets.
2. Probability theory.
3. Vectors and matrices.
4. Convex sets and maxima and minima.
5. Linear programming.

TABLE II
MATHEMATICS CURRICULUM II
(Science Majors)

Terms 1, 2, 3.	<u>Same as I.</u>
Terms 4, 5.	<u>Vectors and matrices, multivariable functions.</u>
Term 6.	<u>Series.</u>
Term 7.	<u>Differential equations and Laplace transforms.</u>
Term 8.	<u>Partial differential equations and special functions.</u>
Term 9.	<u>Functions of a complex variable.</u>

THE CONTINUING EDUCATION PROGRAM

Based upon the conviction that:

1. Man possesses both the capacity and desire to improve himself economically, socially, and culturally; and that
2. Man's educational needs as a worker, parent, and citizen in a free society are co-terminous with life itself; and that
3. A publicly supported university has both the opportunity and obligation to serve such educational needs of its constituency as are appropriate to university-level resources.

Michigan State University-Oakland will develop a vigorous program of continuing education to serve the educational needs of the adults of the Oakland-Macomb community.

The university will provide credit and non-credit programs (courses, conferences, and institutes) in adult education to the extent that its resources will permit. However, such programs will always be restricted and appropriate to university-level resources and standards, avoiding duplication of and overlap with programs of other adult education agencies in the community.

In order to create an early awareness of the need for continuing education on the part of its undergraduates, the administration and faculty of the university will emphasize the implicit need for life-long learning to supplement their four-year experience which, in fact, can serve only as their educational foundation. This emphasis will take form in the establishment of an "Alumni University," a part of the Continuing Education program, which will be designed to serve the post-graduate educational needs of MSUO's alumni (and those alumni of other institutions who reside or work in the community).

In brief, the university will concern itself with serving the educational needs of its graduates throughout life, including those of the professional, parental, and citizenship nature. Alumni will be provided with guidance and

counselling and systematic educational experiences will be offered in refresher and advanced courses -- both credit and non-credit, technical and cultural -- throughout their lifetime. Professional development programs will be closely coordinated with the alumni's employers to insure maximum effectiveness and applicability of these educational experiences.

Another innovation of the Continuing Education program, and consistent with its function as an integral part of the university program, will be the "invitation to learning" extended to the parents of the undergraduate students. It is hoped that one or both parents will enroll in one or more credit or non-credit courses, preferably in subjects related to the undergraduate's program. Since a 'learning environment' in the home would make a major contribution to improved understanding of the educational process on the part of parents of students; but, more importantly, it would add significantly to the confidence, competence, and satisfaction of an important group in the community.

APPENDIX 1

The members of the Michigan State University faculty who were on the original MSUO curriculum committee were as follows:

Thomas H. Hamilton, Chairman
Vice President for Academic Affairs

Walter Adams
Professor, Department of Economics

Edward B. Blackman
Professor and Head, Department of Communication Skills

Cole S. Brembeck
Professor and Head, Department of Foundations of Education

Harold L. Dahnke
Director, Space Utilization and Assignment

Richard Schlegel
Professor, Department of Physics and Astronomy

Lawrence W. Von Tersch
Head, Department of Electrical Engineering

APPENDIX 2

The members of the Zeder committee are as follows:

James C. Zeder, Chairman
Vice President, Chrysler Corporation

Howard R. Carroll
Macomb County Circuit Judge

Miss Marion Goodale
Headmistress, Kingswood School Cranbrook

John Gordon
President, General Motors Corporation

Mrs. Elizabeth H. Gossett

George J. Huebner, Jr.
Executive Engineer, Research Engineering Division, Chrysler Corporation

Ernest A. Jones
President, MacManus, John & Adams

Dana P. Whitmer
Superintendent, Pontiac Public Schools

Theodore O. Yntema
Vice President, Ford Motor Company

THE MEADOW BROOK SEMINARS ON HIGHER LEARNING

Sponsored by Michigan State University-Oakland

LIBERAL ARTS

A Synthesis and Summary Prepared by Thomas H. Hamilton and
Durward B. Varner, Vice Presidents, Michigan State University

The attached summary reflects the general ideas advanced by five top businessmen and educators when asked to address themselves to this question:

"With your experience and knowledge in the field of educational matters, and given a clean slate upon which to write, how would you go about developing a program which will insure that the students at this new institution are, in fact, liberally educated regardless of the field of specialization?"

The panel members were:

- Dr. Sarah G. Blanding, President, Vassar College, Poughkeepsie, New York
- Dr. Henry Steele Commager, Professor of History and American Studies, Amherst College, Amherst, Massachusetts
- Dr. Milton S. Eisenhower, President, Johns Hopkins University, Baltimore, Maryland
- Mr. Henry R. Luce, Editor-in-Chief, Time, Inc., New York City
- Dr. Ralph W. Tyler, Director, Center for Advanced Study in the Behavioral Sciences, Stanford, California

THE MEADOW BROOK SEMINARS ON HIGHER LEARNING
Sponsored by Michigan State University-Oakland

The Liberal Arts

(A synthesis and summary prepared by Thomas H. Hamilton and
Durward B. Varner, vice presidents, Michigan State University.)

It is obvious that education in the liberal arts can and usually does have many purposes. In the first place, whether defined as liberal or general education, there exists a core of disciplines which provides the learning experiences which should be undertaken by all who are educated in an institution of higher learning. The form which such programs takes varies, of course, from institution to institution as does the theoretical sub-structure upon which each rests. But in spite of these differences, there seems to be general recognition that there exists in the liberal arts a body of knowledge, of skills, and in a certain sense, attitudes which all students of collegiate grade should be at the very least exposed to and hopefully master to a degree. In a very real sense this involves the liberal arts serving as an educational experience for not only man as citizen, but man as man--if indeed one can distinguish between the two roles. Another way of speaking of this particular function of the liberal arts is that they provide the best kind of education to develop most completely man's potentiality as man.

The liberal arts, and in this discussion we are including in this term the liberal sciences, also are recognized by many as essential hand-maidens to the preparation for the professions. Here we have a second purpose, and one which casts the liberal arts in a somewhat different intellectual milieu. The liberal arts in the context of assistance for professional preparation can, however, cause difficulties. Emphasis on this second purpose may, in fact, even weaken the liberal arts themselves. In some quarters there is a tendency to disregard the first, one almost says primary, function of the liberal arts discussed above,

and see them solely in this second light. Thus we have courses developing in English for engineers, English for teachers, English for businessmen. Thus the unity which is potentially inherent in the liberal arts at their best is lost. In point of fact there need be no conflict here, for experience demonstrates that the liberal arts serve both functions best when they are taught for their own sake rather than as pillars on which professional education can rest.

Finally the liberal arts constitute so broad a field that many students of college grade properly can concentrate or major in one of them. Thus the student who majors in Philosophy, perhaps even proceeding to the doctorate in this field, is using this liberal discipline in quite a different way from either of the two discussed previously.

To summarize, the liberal arts can serve all students in the sense of providing them with liberalizing learning experiences appropriate to their education as men and citizens. The liberal arts also serve as tools for education for the vocations and the professions. And finally, for some students, the pursuit of the liberal arts themselves or one discipline among them constitutes vocational or professional preparation in itself. The very fact that liberal education is possessed of these three dimensions makes them difficult to keep in constant and true focus. Any discussion of the liberal arts or liberal education tends to lose something in precision by virtue of the almost imperceptible shift of the discussion from one of these functions to another without explicit recognition that the change in vantage point has taken place.

Perhaps a broad approach is called for in which the liberal arts can be considered not only in terms of content but more specifically of function. These functions are primarily two, first to open up for students new areas of experience and, second, to develop an ability in the students to deal with new personal experiences based on their study and analysis of experiences which they can but treat vicariously.

The objectives of education in the liberal arts or liberal education have been stated many times and many places. Unfortunately not always have these statements taken cognizance of the three purposes which the liberal arts serve; for while, by no means mutually exclusive, nevertheless the objectives differ from context to context.

In the sense that the liberal arts should be undertaken to a degree by all students, the objectives usually sought are the development in the students of the ability to communicate with precision and at a level of some profundity. A new dimension to this problem of communication is added as we become increasingly involved in the affairs of the entire world. Thus the ability simply to communicate in one language probably is no longer adequate for even the general student. Certainly the liberal arts also must provide for all students a knowledge of the past not only of his own culture but of others as well. Well taught, such a program will try to bring to bear the abilities derived from this study to an analysis of the contemporary world. An understanding of the nature of science as an intellectual process also is essential for all men who live in the Twentieth Century. Through this, all the liberal arts should attempt to develop in all students an ability to think creatively and critically.

As has been suggested, liberal education taught for general purposes ordinarily is also the best approach when these arts are considered in relation to preparation for a profession. Certain exceptions are of course obvious, but these usually involve intensification of the educational experience in certain of the liberal arts rather than a difference in kind. For example, the engineer will need to proceed more intensively in the liberal sciences if he is to well serve his profession than will, let us say, the creative writer. The businessman will need to spend more time with the behavioral sciences than will the artist. Again, however, it should be emphasized that this is a matter of degree of intensification rather than a complete difference, profession by profession. While the engineer may need more

scientific education of a liberal sort than the creative writer, to deny that the creative writer of the Twentieth Century needs considerable knowledge of science would be foolish.

Finally, of course, the purposes of liberal education for the student who would in effect make the exercise of the liberal arts his vocation, are still different. Here in addition to a broad knowledge of all the liberal arts, the student must pursue at least one of them until it is comprehended at the level where the student is enabled to truly engage in creative and critical thinking in the field. In this connection, of course, the specific purposes must necessarily vary depending on which of the liberal arts the student selects for concentration.

Liberal education must of necessity go beyond the perfunctory and permit the student to deal with problems of fundamental importance. The liberal arts must not shy away from even such a fundamental question as "What is the purpose of life?" Or, again, the student who is in the process of being liberally educated must at least attempt such intellectual challenges as that of reconciling the demands of the individual and the demands of society. And the answer must be pursued at levels considerably more profound than is now characteristic of much education of this sort. Students must be led to examine the implications of the egalitarianism present in American society and recognize the problem this poses for the search for excellence. New ways must be sought to achieve a synthesis which permit retention in the social fabric of many values without the development of contradictions so severe as to rend that fabric. Such a program will inevitably be possessed of humanistic, political and philosophical and religious facets.

More is involved in an effective program in liberal education, however, than simply a consideration of objectives or content or questions, vital as these may be. Too little attention has been given to the ways in which students may be expected to learn in these areas in the sense that learning involves a change, either overt or covert, in student behavior in a desired direction. There is

considerable evidence here, much of which has been ignored. A number of studies indicate the necessity for the student himself knowing what learning and education is. Good students tend to recognize that what they get in college are new ways of approaching problems rather than items to be remembered. It is usually the poor learner who wants content and specific skills. The implication here is that we might, in teaching the liberal arts, spend more time in helping the student to understand the purposes and assumptions. Many college students find little meaning in what they are doing in college. Much of this certainly can be traced primarily to a lack of vitality and relevance in the program. Efforts should be made to demonstrate to the student that some of the abilities being developed have immediate carry-over into contemporary situations with which he is concerned. There is also a necessity that the student who arrives on a college campus be immediately challenged by the necessity for developing new competencies which are sufficiently different than those with which he was concerned in secondary school to furnish him adequate challenge, but not so difficult and new as to cause him totally to lose confidence.

There seems to be agreement that a new institution of higher learning needs to break away from many of the restrictions which have grown up in those that have existed for some time. There should be a de-emphasis of such things as courses, credits, examinations, and formal teaching. A great deal more stress should be given to students learning. Thus the library and the laboratory should replace the classroom as the center of the educational program. We have put far too much emphasis on a student attending class for a given number of hours each week and listening to lectures. This has made the students' role in learning essentially a passive one.

If a new approach is to succeed, of course, it becomes more important than ever that great attention be given to the total environment. Desirable

intellectual outcomes can be expected only in an atmosphere consciously made propitious for intellectual activities. Many positive things can be done to assist, but there also are some things to be avoided such as intercollegiate athletics, sororities and fraternities, the course system, the lecture system, the proliferation of courses, grades and examinations, and rigid departmental organization.

Above all a proper university must, as one of its functions in the liberal arts, maintain an environment in which the quest for truth is recognized as primary. For just as this quest for truth made of Athens "a mad, miracle of a city--flashing out in all directions," so in this quest is the hope for a free society.

THE MEADOW BROOK SEMINARS ON HIGHER LEARNING

Sponsored by Michigan State University-Oakland

TEACHER PREPARATION

A Synthesis and Summary Prepared by Thomas H. Hamilton and
Durward B. Varner, Vice Presidents, Michigan State University

The attached summary reflects the general ideas advanced by six top educators when asked to address themselves to this question:

"With your knowledge and experience in the field of education, how would you organize a program in teacher education at this new institution to train teachers for the half century ahead of us?"

The panel members were:

- Dr. Samuel M. Brownell, Superintendent of Public Schools,
Detroit
- Dr. Henry T. Heald, President and Director of The Ford Foundation,
New York City
- Dr. Henry H. Hill, President, George Peabody College for Teachers,
Nashville, Tennessee
- Mr. Francis Keppel, Dean of Faculty of Education, Harvard University,
Cambridge, Massachusetts
- Dr. Ernest O. Melby, Distinguished Professor of Education, Michigan
State University, East Lansing, Michigan
- Dr. Carroll V. Newsom, President, New York University, New York City

THE MEADOW BROOK SEMINARS ON HIGHER LEARNING
SPONSORED BY MICHIGAN STATE UNIVERSITY-OAKLAND

TEACHER PREPARATION

(A SYNTHESIS AND SUMMARY PREPARED BY THOMAS H. HAMILTON AND
DURWARD B. VARNER, VICE PRESIDENTS, MICHIGAN STATE UNIVERSITY)

THAT THE POSITION OF THE UNITED STATES BOTH AT HOME AND ABROAD IS PRECARIOUS IS A PROPOSITION GENERALLY ACCEPTED AS VALID. DOMESTICALLY, WE FIND OURSELVES, AT THE MOMENT, APPARENTLY UNABLE TO COPE WITH CERTAIN OF THE PROBLEMS WHICH HAVE EMERGED IN OUR DYNAMIC SOCIETY. ABROAD WE ARE CHALLENGED AS NEVER BEFORE TO SHOW THAT WE POSSESS THE PHILOSOPHY, THE KNOWLEDGE, THE WILLINGNESS, THE ENERGY TO ENABLE US TO TAKE THE LEAD IN THE ESTABLISHMENT OF THE GOOD SOCIETY THROUGHOUT THE WORLD. THERE ARE THOSE WHO THINK THAT BOTH DOMESTICALLY AND INTERNATIONALLY WE HAVE SERIOUSLY LOST GROUND IN TERMS OF BOTH OUR COPING AND OUR LEADING DURING THE LAST QUARTER OF A CENTURY. WHETHER OR NOT THIS BE TRUE, THERE IS NO DOUBT THAT OUR PLIGHT IS SERIOUS. PERHAPS IT ALWAYS HAS BEEN. EQUALLY CERTAIN IS THE FACT THAT THE ONLY LONG-RANGE SOLUTIONS WHICH SEEM TO GIVE PROMISE ARE DEEPLY ROOTED IN AND DEPENDENT ON THE QUALITY OF OUR EDUCATIONAL PROCESS. THERE IS LITTLE ARGUMENT THAT THE CENTER OF THIS EDUCATIONAL PROCESS IS THE TEACHER, AND WE CANNOT HOPE FOR THAT PROCESS TO RISE IN QUALITY ABOVE THAT OF THE INDIVIDUALS WHO PLAY THIS CENTRAL ROLE.

FOR THIS REASON, A SEMINAR DEVOTED TO A CONSIDERATION OF TEACHER PREPARATION HAS SIGNIFICANCE FAR BEYOND ONE WHICH CONCERNS ITSELF WITH BUT A SPECIAL FIELD. IT IS OF LITTLE USE TO DISCUSS PROGRAMS IN ENGINEERING, IN SCIENCE, AND IN BUSINESS IF THE STUDENTS WHO ARRIVE ON THE UNIVERSITY CAMPUS TO UNDERTAKE THEM HAVE BEEN TAUGHT INADEQUATELY THROUGHOUT THEIR ELEMENTARY AND SECONDARY EXPERIENCE.

COMPOUNDING OUR DIFFICULTIES, ALTHOUGH PERHAPS IF PROPERLY DEALT WITH, MULTIPLYING OUR OPPORTUNITIES, IS THE FACT THAT THE COMMUNITY AS A WHOLE HAS BECOME A MOST EFFECTIVE TEACHER, PERHAPS MORE EFFECTIVE THAN THE SCHOOLS THEMSELVES.

VALUES, ATTITUDES, EVEN THE WILLINGNESS TO LEARN SEEM IN LARGE PART TO BE A REFLECTION OF THE COMMUNITY RATHER THAN LEARNED IN THE CLASSROOM. TO A DEGREE THIS HAS ALWAYS BEEN THE CASE; BUT SUPPORT MIGHT WELL BE FOUND FOR THE HYPOTHESIS THAT THERE HAS BEEN AN INCREASE IN THE SUCCESS OF THE IMPACT OF THAT PORTION OF THE COMMUNITY OTHER THAN THE SCHOOL, THE HOME, AND THE CHURCH; AND THERE IS LITTLE EVIDENCE THAT THE SHIFT WILL ASSURE A HAPPIER SITUATION EITHER FOR SOCIETY OR THE INDIVIDUAL.

PERHAPS A SENSIBLE POINT OF DEPARTURE WOULD BE TO MAKE CERTAIN THAT IT WAS THOROUGHLY UNDERSTOOD THAT THE PREPARATION OF TEACHERS IS A RESPONSIBILITY OF THE TOTAL UNIVERSITY AND CANNOT, WITH SUCCESS, BE DELEGATED ALONE TO ANY DEPARTMENT OR DIVISION OR COLLEGE. THE REASON FOR THIS STEMS FROM THE FACT THAT THE PREPARATION OF TEACHERS IS NEITHER A SIMPLE NOR UNITARY TASK, BUT RATHER A COMPLICATED FOUR-FACETED RESPONSIBILITY WHICH CAN ONLY BE BORNE BY THE TOTAL UNIVERSITY. IT MUST NOT BE HELD THAT EACH OF THESE RESPONSIBILITIES IS THE EXCLUSIVE CONCERN OF A SINGLE SECTOR OF THE UNIVERSITY. ON THE CONTRARY, AS WILL BE SEEN, THESE FUNCTIONS, REGARDLESS OF BY WHOM TREATED, MUST ALWAYS BE VIEWED AS INTERRELATED, SUPPLEMENTARY, AND COMPLEMENTARY RATHER THAN DISCRETE.

FIRST, IT SHOULD BE OBSERVED THAT ALL TEACHERS REGARDLESS OF LEVEL OR SPECIALITY MUST BE PROVIDED A LIBERAL OR GENERAL EDUCATION OF EXCELLENCE. NOT ALL WOULD AGREE PRECISELY AS TO WHAT THE CONTENT OF SUCH A LIBERAL EDUCATION SHOULD BE, AND CERTAINLY NOT ALL COURSES WHICH DESCRIBE THEMSELVES AS LIBERAL MERIT THE LABEL. IN ALL LIKELIHOOD, HOWEVER, THE PRESENCE OF LIBERAL PROGRAMS WHICH PURSUE THEIR REASONABLY SIMILAR OBJECTIVES BY VARIOUS ROUTES IS HEALTHY IN OUR PLURALISTIC SOCIETY. CERTAINLY THERE WOULD BE FAIR AGREEMENT THAT THE LIBERALLY EDUCATED PERSON, BE HE TEACHER OR ENGINEER OR DOCTOR, SHOULD KNOW SOMETHING ABOUT THE SOCIAL WORLD IN WHICH HE LIVES, ITS HISTORY AND CULTURAL ANTECEDENTS, POSSESS AN UNDERSTANDING OF THE NATURE OF SCIENCE AS AN INTELLECTUAL PROCESS, BE CHARACTERIZED BY CONSIDERABLE ABILITY IN THE SKILLS OF COMMUNICATION SO TAUGHT AS TO TAKE FULL

COGNIZANCE OF THE RELATIONSHIP OF SKILLS TO CONTENT. THIS SEEMS MINIMAL. IT ALSO IS AGREED THAT TEACHERS SHOULD RECEIVE THIS LIBERAL EDUCATION IN THE COMPANY OF THOSE WHO ARE BEING PREPARED FOR OTHER PROFESSIONS. LIBERAL EDUCATION KNOWS NO GEOGRAPHICAL BOUNDARIES, NEITHER DOES IT RECOGNIZE PROFESSIONAL PROVINCES. THAT STUDENTS WITH VARYING PROFESSIONAL AMBITIONS CAN WITH PROFIT LEARN TOGETHER SEEMS OBVIOUS.

A SECOND DIMENSION OF THIS COMPLEX OF EDUCATION DESIGNED TO PREPARE TEACHERS IS INVOLVED IN PROVIDING FOR PROSPECTIVE TEACHERS LEARNING EXPERIENCES WHICH WILL MAKE CERTAIN THAT THEY HAVE COMPETENCE IN THE SPECIAL FIELD IN WHICH THEY ARE TO BE CERTIFIED AS TEACHERS. HOW EXTENSIVE THIS SHOULD BE CANNOT BE ANSWERED GENERALLY. PERHAPS IT WOULD BE WELL TO DESCRIBE THE DESIRABLE SITUATION IN TERMS OF THE STUDENT ACHIEVING SUFFICIENT COMPETENCE OF THIS NATURE THAT, IF IT SUBSEQUENTLY PROVES FEASIBLE, THE TEACHER CAN BUILD A GRADUATE PROGRAM ON THIS UNDERGRADUATE TRAINING. THE ELEMENTARY TEACHER NATURALLY PRESENTS A SPECIAL PROBLEM IN THIS CONNECTION, FOR WHAT IN FACT, IS THE SPECIAL COMPETENCE WHICH HE SHOULD ACQUIRE? UNDER PRESENT CIRCUMSTANCES, HE SHOULD IDEALLY BE PROVIDED WITH THE MOST COMPREHENSIVE "GENERAL" EDUCATION POSSIBLE. WHILE IT CAN BE HELD THAT THE ELEMENTARY TEACHER SHOULD BE EXPECTED TO DEMONSTRATE A SUBJECT-MATTER COMPETENCE OF NO LESS QUALITY THAN THAT DISPLAYED BY THE SECONDARY TEACHER, THERE IS A POINT OF VIEW HOLDING THAT THE SPECIAL COMPETENCE CALLED FOR IN THIS CASE IS A THOROUGH UNDERSTANDING OF CHILDREN AND HOW THEY LEARN AND GROW.

IT IS THE THIRD FUNCTION TO WHICH THE MOST ADVERSE CRITICISM IN THE PREPARATION OF TEACHERS RECENTLY HAS BEEN DIRECTED. THIS HAS TO DO WITH PROFESSIONAL EDUCATION. LET IT BE SAID AT THE OUTSET THAT NO ONE CONCERNED WITH TEACHER PREPARATION WOULD DENY THAT IN SOME QUARTERS THERE HAS BEEN SUPERFICIALITY IN THIS AREA AND FRAGMENTATION OF COURSES AND SUBJECT MATTER. NEEDLESS TO SAY, THIS IS NOT THE ONLY AREA IN A UNIVERSITY WHERE GUILT ON THESE CHARGES CAN BE PROVED; BUT THE FACT REMAINS THAT COURSES IN PROFESSIONAL EDUCATION ARE IN NEED OF CONSTANT REVIEW

AND SCRUTINY BOTH BY THOSE WITHIN AND WITHOUT THE FIELD. BUT WHEN ALL THIS HAS BEEN ADMITTED, THE FACT REMAINS THAT IT IS DIFFICULT TO SEE HOW ONE COULD ADEQUATELY PREPARE TEACHERS IN CONTEMPORARY SOCIETY WITHOUT THE AVAILABILITY OF CERTAIN OF THE COMPETENCIES AND KNOWLEDGE THAT HAVE BEEN DEVELOPED IN THIS FIELD. IT SEEMS CLEAR THAT PROSPECTIVE TEACHERS SHOULD UNDERSTAND THE HISTORY OF THE AMERICAN PUBLIC SCHOOL AS WELL AS THE PHILOSOPHICAL POSITION ON WHICH IT RESTS. A KNOWLEDGE OF THE CONTINUING INTER-ACTION BETWEEN THE SCHOOL AND THE SOCIAL ORDER IS NECESSARY. SIMILARLY, THE TEACHER SHOULD COMPREHEND TO THE BEST OF HIS ABILITY THE NATURE OF THE LEARNING PROCESS AND ITS IMPLICATIONS FOR TEACHING METHODS. FINALLY, THERE ARE ALMOST NONE WHO WOULD DENY THE NECESSITY FOR PROVIDING, IN ONE WAY OR ANOTHER, AN INTERNSHIP THROUGH THE FORM OF WHAT ORDINARILY IS CALLED "PRACTICE TEACHING." IF THERE BE VALID CRITICISM ON THIS, IT WOULD BE THAT FREQUENTLY THE PRACTICE TEACHING EXPERIENCE HAS NOT BEEN INTENSIVE ENOUGH NOR COUPLED WITH AN OPPORTUNITY FOR LEARNING THROUGH STUDY OF AND REFLECTION ON THE EXPERIENCE.

ACKNOWLEDGING THE NECESSITY FOR WORK IN THE FIELD OF PROFESSIONAL EDUCATION, THERE REMAINS THE PROBLEM OF HOW MUCH OF THE TOTAL COLLEGIATE PROGRAM SHOULD THE PROSPECTIVE TEACHER DEVOTE TO SUCH STUDIES? INEVITABLY THE ANSWER TO THIS QUESTION MUST BE QUANTITATIVE, BUT IT IS UNFORTUNATE THAT SUCH IS THE CASE. THE IMPORTANT MATTER IS THE ACHIEVEMENT OF CERTAIN EDUCATIONAL OBJECTIVES, NOT THE NUMBER OF SEMESTER HOURS TAKEN. INFORMED OPINION WOULD INDICATE THAT, INCLUDING THE PRACTICE TEACHING EXPERIENCE, THE VALID OBJECTIVES OF THE PROFESSIONAL PART OF A STUDENT'S PROGRAM SHOULD BE ATTAINABLE BY MOST STUDENTS IN FROM ONE-SIXTH TO ONE-SEVENTH OF THE EFFORT DEVOTED TO THE TOTAL UNDERGRADUATE PROGRAM.

THE FOURTH AND LAST ASPECT OF THE TEACHER PREPARATION PROGRAM HAS TO DO WITH GETTING EACH STUDENT TO TRULY UNDERSTAND THE NATURE OF THE DISCIPLINE WHICH HE ASPIRES TO TEACH. THIS IS A SOMEWHAT MORE NEWLY RECOGNIZED DIMENSION OF THE TEACHER PREPARATION PROGRAM. IT IS AN EDUCATIONAL TASK WHICH WE SEEM TO HAVE PER-

FORMED BADLY. IN THE FIELD OF MATHEMATICS, FOR EXAMPLE, THERE ARE MANY TEACHERS WHO ARE COMPETENT TO DEAL WITH THE SUBJECT IN THE MANIPULATIVE SENSE. THEY ARE ABLE TO TEACH PROCESSES AND TURN OUT STUDENTS WHO CAN FOLLOW DIRECTIONS WITH REASONABLE ACCURACY, BUT FAR LESS SUCCESS ATTENDS THEIR EFFORTS TO GIVE TO STUDENTS AN UNDERSTANDING OF THE NATURE OF MATHEMATICS AS AN INTELLECTUAL DISCIPLINE AND ITS PROPER RELATIONSHIP TO OTHER DISCIPLINES AND, INDEED, TO THE WHOLE HISTORY OF IDEAS. PROBABLY BY THE VERY NATURE OF THE CASE, THIS IS A FUNCTION WHICH WILL HAVE TO BE PERFORMED AT LEAST IN LARGE PART BY THOSE WHO TEACH THE SUBJECT-MATTER COURSES AT THE UNIVERSITY LEVEL. IF IT EVENTUATES THAT SOME OF THESE UNIVERSITY LEVEL SPECIALISTS DO NOT THEMSELVES UNDERSTAND THE NATURE OF THEIR DISCIPLINE IN THIS SENSE, SOME EMBARRASSMENT MAY ENSUE.

AGAIN IT SHOULD BE EMPHASIZED THAT THESE FUNCTIONS ARE BY NO MEANS DISCRETE. LIBERAL EDUCATION FREQUENTLY PROVIDES THE NECESSARY SUBJECT MATTER FOR A TEACHER, AND PROFESSIONAL EDUCATION COURSES IF PROPERLY TAUGHT CAN MEET LIBERAL OBJECTIVES. CERTAINLY A THOROUGH UNDERSTANDING OF THE NATURE OF A DISCIPLINE SHOULD GIVE VALID CLUES TO THE BEST METHODS BY WHICH IT CAN BE TAUGHT. THE IMPLICATIONS, THEN, ARE CLEAR. ONLY THE ENTIRE UNIVERSITY IS COMPETENT IN THE LAST ANALYSES TO ASSUME THE RESPONSIBILITY FOR THE PREPARATION OF TEACHERS.

OF RECENT YEARS WE HAVE COME TO RECOGNIZE IN PREPARATION FOR TEACHING, AS WITH PREPARATION FOR OTHER PROFESSIONS, THAT THE UNIVERSITY IS NOT WELL EQUIPPED TO DO ALL THAT IS REQUIRED. JUST AS IN MEDICINE THERE SEEMS TO BE A DESIRABLE DIVISION OF RESPONSIBILITY BETWEEN THE UNIVERSITY ON THE ONE HAND AND THE HOSPITAL ON THE OTHER, SO IN THE PREPARATION OF TEACHERS SHOULD THE SCHOOL SYSTEM SHARE THE RESPONSIBILITY WITH THE UNIVERSITY. THE PROBLEM, OF COURSE, LIES IN THE DIFFICULTY IN DETERMINING WHO SHOULD DO WHAT. GENERALLY SPEAKING, THERE SEEMS TO BE AGREEMENT THAT THE UNIVERSITIES SHOULD DEAL PRIMARILY WITH THE THEORETICAL, THE SCIENTIFIC, AND THE SUBSTANTIVE, LEAVING PROBLEMS OF APPLICATION TO BE CONSIDERED WITHIN THE PUBLIC SCHOOL SYSTEM. TO BE SPECIFIC, MUCH OF WHAT IS NOW TAUGHT IN THE FIELD

OF ADMINISTRATION, BUSINESS MANAGEMENT, AND AUDIO VISUAL MATERIALS, TO NAME BUT A FEW AREAS, MIGHT BE LEARNED BETTER UNDER THE AUSPICES OF THE SCHOOL SYSTEM.

IN POINT OF FACT, A MAJOR IMPROVEMENT IN THE PREPARATION OF TEACHERS COULD BE ATTAINED IF THE UNIVERSITIES AND THE SCHOOL SYSTEMS WERE TO RECOGNIZE MORE FULLY THAT THEIRS WAS A JOINT RESPONSIBILITY. THERE MIGHT BE REAL MERIT, FOR EXAMPLE, IN DEVELOPING A TEACHER PREPARATION PROGRAM WHICH IN TOTAL WAS OF FIVE YEARS IN LENGTH, BUT WITH THE LAST TWO YEARS SHARED BY THE SCHOOL SYSTEM AND THE UNIVERSITY WITH THE STUDENT BEING PAID FULL SALARY DURING THIS PERIOD.

SOME SUCH COOPERATIVE ARRANGEMENT BETWEEN THE UNIVERSITIES AND THE SCHOOL SYSTEMS MIGHT ASSIST IN PREVENTING A LOSS OF PERSONNEL IN THE TEACHING PROFESSION WHICH COMES ABOUT THROUGH THE NEW TEACHER NOT BEING ADEQUATELY PREPARED FOR THE SHOCK OF THE FIRST FULL-TIME TEACHING ASSIGNMENT. THE STEP FROM THE CAMPUS TO A CLASSROOM WITH THIRTY OR FORTY YOUNGSTERS NOT ALL COMPLETELY DEDICATED TO LEARNING, OR FOR THAT MATTER NECESSARILY EVEN DECORUM, SURROUNDED BY THE COMPLEXITIES OF THE COMMUNITY, THE BUREAUCRACY, THE PARENTS, IS A GIANT ONE. TOO MANY PROMISING TEACHERS NEVER RECOVER, AND QUICKLY DECIDE THAT THEIR CHOICE OF A PROFESSION WAS ILL-ADVISED.

THIS "COMMUNITY SHOCK" EFFECT HAS BEEN HEIGHTENED OF RECENT YEARS FOR THE NEW TEACHER COMES TO THE COMMUNITY WITH RELATIVELY LESS STATUS THAN WAS FORMERLY THE CASE. THERE ARE MANY REASONS FOR THIS, NOT THE LEAST OF WHICH IS THAT THE TOTAL EDUCATIONAL LEVEL OF THE COMMUNITY IS MUCH HIGHER THAN IN EARLIER TIMES. THE NEW TEACHER WILL FIND IT FAR MORE DIFFICULT TO ESTABLISH HIS POSITION AS AN INTELLECTUAL AND CULTURAL LEADER THAN DID HIS PREDECESSORS.

ONE OF THE PROBLEMS WHICH CONFRONTS THOSE WHO ARE CONCERNED WITH THE PREPARATION OF TEACHERS IN THE UNITED STATES IS THE LACK OF CAREER STABILITY WHICH CHARACTERIZES THE PROFESSION. ALL TOO OFTEN THE TEACHER ENTERS HIS PROFESSION CLEARLY RECOGNIZING THAT IT IS NOT SOMETHING TO WHICH HIS FULL PROFESSIONAL LIFE WILL BE DEVOTED. THE PRIMARY REASON FOR THIS RESTS IN THE FACT THAT SO MANY OF OUR

ELEMENTARY AND SECONDARY SCHOOL TEACHERS ARE WOMEN WHO PLAN FROM THE BEGINNING TO TEACH ONLY UNTIL THEY HAVE ASSUMED THEIR ROLE AS WIFE AND MOTHER. QUITE NATURALLY, WITH SUCH A LARGE SEGMENT OF THE TEACHER POPULATION BEING SO MOTIVATED, IT IS DIFFICULT TO BUILD THE DEDICATED, CAREER-MINDED PROFESSION WHICH IS SO NEEDED. PART OF THE ANSWER TO THIS DILEMMA LIES IN ATTRACTING MORE MEN TO ELEMENTARY AND SECONDARY SCHOOL TEACHING. THERE IS EVIDENCE THAT PROGRESS IS BEING MADE ON THIS FRONT.

MAKING TEACHING A CAREER TO WHICH BOTH MEN AND WOMEN WILL BE WILLING TO DEDICATE THEIR LIVES IS NOT EASY. SOME OF THE DIFFICULTY RESTS IN THE MATTER OF SALARIES, AND THERE IS NO DOUBT THAT THESE NEED TO BE INCREASED MARKEDLY. BUT MORE THAN THIS IS REQUIRED. SOMEHOW COMMUNITIES MUST NOT ONLY ACCORD TO THEIR TEACHERS APPROPRIATE STATUS, BUT SCHOOL SYSTEMS MUST PROVIDE A SITUATION WHERE ABLE MEN AND WOMEN CAN SEE FOR THE ENTIRETY OF THEIR PROFESSIONAL LIVES SUCH CHALLENGE THAT THEY WILL NOT BE TEMPTED TO DESERT THE PROFESSION FOR OTHER PURSUITS. THIS MEANS THAT SCHOOL SYSTEMS MUST RID THE TEACHER OF THE NECESSITY FOR BEING CLERK, JANITOR, AND NURSE AND MUST PROVIDE A WAY FOR THE ABLE AND ENERGETIC TO RISE IN RESPONSIBILITY AND SALARY AS THEIR CAREERS DEVELOP.

ONE OF THE MATTERS FREQUENTLY DISCUSSED IN THE PREPARATION OF TEACHERS HAS TO DO WITH THE POINT AT WHICH STUDENTS SHOULD CHOOSE THEIR CAREERS. ON THIS MATTER THERE IS SOME DISAGREEMENT. THOSE WHO FAVOR A LATE CHOICE OBSERVE THAT MANY BRIGHT COLLEGE STUDENTS DO NOT CRYSTALLIZE THEIR INTERESTS UNTIL THE LATER PART OF THEIR COLLEGIATE CAREERS AND THUS WOULD MAKE THE TEACHER PREPARATION PROGRAM SUFFICIENTLY FLEXIBLE THAT AT ALMOST ANY TIME A STUDENT MIGHT ENTER INTO IT. ON THE OTHER HAND, THERE ARE THOSE WHO HOLD THAT CAREER CHOICES ARE BEING MADE TOO LATE AND THAT IT WOULD BE WISE TO HASTEN THE PROCEDURE RATHER THAN DELAY IT. PERHAPS THE BEST AGREEMENT WHICH CAN BE REACHED IS THAT FOR MOST STUDENTS THE DECISION TO ENTER THE TEACHER PREPARATION PROGRAM SHOULD BE MADE AT THE END OF THE SOPHOMORE YEAR BUT THAT THE PROGRAM SHOULD BE POSSESSED OF SUFFICIENT

FLEXIBILITY THAT LATER CHOICE WOULD BE POSSIBLE.

MANY STUDENTS OF THE EDUCATIONAL SCENE HAVE POINTED OUT THAT THE TEACHER PREPARATION PROGRAM WOULD BE FAR LESS DIFFICULT TO OPERATE IF THE CANDIDATES FOR IT WERE SELECTED WITH GREATER CARE. THERE IS NO DOUBT THIS IS TRUE. IN FACT, THE WORLD'S PROBLEMS WOULD BE CONSIDERABLY DIMINISHED WERE THE SUPPLY OF ANGELS LESS LIMITED. GIVEN THE GREAT NEED FOR TEACHERS, IT SEEMS QUITE UNREALISTIC TO ASSUME THAT THE IMMEDIATE FUTURE WILL PERMIT OF MUCH GREATER SELECTIVITY THAN IS NOW PRACTICED. OTHER PROFESSIONS ALSO ARE SEEKING AND NEED THE ABLE INDIVIDUALS. IT SEEMS UNLIKELY, AND PERHAPS UNWISE, THAT THE TEACHING PROFESSION WILL BE ABLE TO ATTRACT A DISPROPORTIONATE SHARE OF THE GIFTED.

EVEN TO THE EXTENT THAT SELECTIVITY IS POSSIBLE, THE INSTRUMENTS ON WHICH JUDGMENTS CAN BE MADE ARE FAR FROM INFALLIBLE. INTELLECTUAL ABILITY AND PERFORMANCE CAN BE MEASURED REASONABLY WELL, BUT THE MORE IMPORTANT DESIRE TO CONTINUE TO LEARN IS IDENTIFIED WITH GREAT DIFFICULTY. HEALTH AND APPEARANCE, TO THE EXTENT THESE ARE RELEVANT, CAN BE APPRAISED. IT IS IN THE AREA OF THE PROSPECTIVE TEACHER'S PERSONALITY THAT GREAT FUZZINESS ATTENDS THE EFFORTS TO SELECT. INSTRUMENTS ARE SO WEAK, THE POSSIBILITIES OF GREAT DAMAGE BY THE PROJECTION OF STEREOTYPES SO GREAT THAT CAUTION MUST BE EXERCISED IN ACTING ON THE VALID PROPOSITION THAT THE TEACHER'S PERSONALITY IS AN IMPORTANT PART OF THE LEARNING PROCESS. IT SHOULD BE POSSIBLE, AND IS IN FACT IMPERATIVE, HOWEVER, TO PROVIDE SPECIAL EDUCATIONAL CHALLENGE TO THE ABLE STUDENTS WHO ARE ATTRACTED TO THE PROFESSION. IN OUR CONCERN FOR QUANTITY THE DIMENSION OF QUALITY CANNOT BE IGNORED.

THE GREAT DANGER FACED BY EVEN A NEW UNIVERSITY WILL BE ITS FAILURE TO TAKE INTO ACCOUNT THE FACT THAT THE FUTURE WILL BE CHARACTERIZED, AS IS THE PRESENT, BY GREAT CHANGE. IN SHORT, WE MUST PLAN ON A SOCIAL ORDER WHERE PERHAPS THE ONLY CONSTANT IS THE LACK OF A CONSTANT. THIS MEANS THAT THE ADMINISTRATION OF A UNIVERSITY AND ITS FACULTY MUST CONTINUE TO BE IMAGINATIVE USING THE KNOWLEDGE

OF THE PAST BUT REFUSING TO BE BOUND BY PAST LIMITATIONS. ONLY IN THIS WAY WILL IT BE POSSIBLE TO ATTRACT THE QUALITY OF FACULTY ESSENTIAL. THIS EXERCISE OF IMAGINATION IN FACT IS THE TASK OF THE UNIVERSITY, IN ANY EVENT, WHETHER IT IS CONCERNED WITH THE PREPARATION OF TEACHERS, LAWYERS, PHYSICIANS, OR CITIZENS. AS ALFRED NORTH WHITEHEAD HAS PUT IT, "FOOLS ACT ON IMAGINATION WITHOUT KNOWLEDGE; PEDANTS ACT ON KNOWLEDGE WITHOUT IMAGINATION. THE TASK OF A UNIVERSITY IS TO WELD TOGETHER IMAGINATION AND EXPERIENCE."

THE MEADOW BROOK SEMINARS ON HIGHER LEARNING

Sponsored by Michigan State University-Oakland

BUSINESS ADMINISTRATION

A Synthesis and Summary Prepared by Thomas H. Hamilton and
Durward B. Varner, Vice Presidents, Michigan State University

The attached summary reflects the general ideas advanced by five top businessmen and business educators when asked to address themselves to this question:

"With your knowledge and experience in the field of business and business administration, and given a clean slate upon which to write, how would you organize a program in business administration at this new institution to train business leaders for the half century ahead?"

The panel members were:

Dean George L. Bach, Graduate School of Industrial Administration,
Carnegie Institute of Technology, Pittsburgh, Pennsylvania

Mr. William H. Coleman, President and Director, Twin Coach Company,
Kent, Ohio

Mr. Theodore V. Houser, Chairman, Board of Directors, Sears, Roebuck &
Company, Chicago, Illinois

Dr. Frank C. Pierson, Professor, Department of Economics, Swarthmore
College, Swarthmore, Pennsylvania

Dr. Erwin H. Schell, Professor Emeritus and Lecturer, School of
Industrial Management, Massachusetts Institute of Technology,
Cambridge, Massachusetts

THE MEADOWBROOK SEMINARS ON HIGHER LEARNING
SPONSORED BY MICHIGAN STATE UNIVERSITY - OAKLAND
EDUCATION FOR BUSINESS

(A SYNTHESIS AND SUMMARY PREPARED BY THOMAS H. HAMILTON AND DURWARD B. VARNER,
VICE PRESIDENTS, MICHIGAN STATE UNIVERSITY)

FOR MANY YEARS THERE APPEARED TO BE A TREND IN THE RECRUITING PRACTICES OF AMERICAN INDUSTRIAL ORGANIZATIONS. IT SEEMED THAT WITH THE PASSING OF EVERY YEAR A GREATER NUMBER OF POTENTIAL EMPLOYEES WERE SOUGHT FROM AMONG THE EXPANDING POOL OF STUDENTS WHO HAD ELECTED TO CONCENTRATE IN THE MORE PRACTICAL, VOCATIONAL DISCIPLINES. PERHAPS UNDERSTANDABLY, MANY COLLEGES AND UNIVERSITIES RESPONDED TO THIS TREND, AND IN FACT ENCOURAGED IT BY DEVOTING MORE OF THEIR RESOURCES TO JUST THOSE VOCATIONAL PROGRAMS IN DEMAND. THAT THIS TREND ALARMED THE FRIENDS OF GENERAL OR LIBERAL EDUCATION IS AN IMPORTANT BUT MOOT POINT; MORE VITAL TO OUR PRESENT CONSIDERATION IS THE SIGNIFICANCE IT HAS, NOT ONLY FOR OUR INDUSTRIAL ORGANIZATIONS, BUT FOR THOSE INSTITUTIONS OF HIGHER LEARNING RESPONSIBLE FOR BUSINESS EDUCATION.

IT IS PERHAPS UNNECESSARY TO POINT OUT THAT AS OUR SOCIAL AND ECONOMIC ORGANIZATION BECOMES MORE COMPLEX AND TECHNOLOGICALLY ORIENTED, AMERICAN INDUSTRY WILL CONTINUE TO NEED HIGHLY TRAINED AND SKILLED SCIENTISTS AND TECHNICIANS. BUT, AS INDUSTRY IS FAST DISCOVERING FOR ITSELF, SCIENCE IS CONCERNED PRIMARILY WITH THE MEASURABLE, AND WHEN YOU HAVE ADDED UP ALL THE FACTORS OF A MAN THAT CAN BE MEASURED, YOU STILL HAVE NOT DESCRIBED OR UNDERSTOOD HIM. A SURVEY RECENTLY CONDUCTED BY A LARGE OIL COMPANY REVEALED THAT IN SEVENTY-SIX AMERICAN CORPORATIONS, LACK OF JOB KNOWLEDGE OR SKILL ACCOUNTED FOR ONLY A SHADE OVER TEN PERCENT OF THE DISCHARGES. THE REMAINING NINETY PERCENT WERE DISCHARGED FOR JUST THOSE HUMAN QUALITIES, OR RATHER FOR THEIR ABSENCE, WHICH HAVE NOTHING WHATSOEVER TO DO WITH TECHNICAL COMPETENCE.

NOW THESE FACTS HAVE RELEVANCE FOR THOSE WHO ARE CONCERNED WITH EDUCATION FOR BUSINESS. IT HAS BECOME INCREASINGLY CLEAR THAT IT IS NOT THE FUNCTION OF OUR

UNDERGRADUATE EDUCATION TO TRAIN A BUSINESSMAN, BUT TO PRODUCE A CITIZEN AND AN EDUCATED HUMAN BEING. WHILE IT IS TRUE THAT THE STUDENT SHOULD BE PROVIDED WITH SUFFICIENT ORIENTATION TOWARD HIS VOCATION SO THAT ENTRANCE INTO IT WILL BE FACILITATED, IT IS TRUER STILL THAT ANY CURRICULUM WHICH ATTEMPTS TO PROVIDE AT THE UNDERGRADUATE LEVEL ALL OF THE SKILLS AND KNOWLEDGE WHICH THE MATURE BUSINESSMAN HAS AT HIS DISPOSAL IS DESTINED TO FAILURE FROM THE OUTSET. SUCH A CURRICULUM NOT ONLY OVERLOOKS THE PRIMARY FUNCTION OF AN UNDERGRADUATE EDUCATION, BUT IT TOTALLY IGNORES THE PLURALITY OF BUSINESS METHODOLOGY AND THE NATURE OF CHANGE IN A DYNAMIC SOCIETY.

TO INDICATE THAT THE FUNCTION OF A UNIVERSITY EDUCATION CAN NEVER BE SPECIFICALLY TO TRAIN BUSINESSMEN IS NOT TO IMPLY THAT THE BUSINESS PROFESSION IS NOT IN NEED OF COMPETENT AND WELL-TRAINED PERSONNEL. ON THE CONTRARY, AS BUSINESS BECOMES MORE AND MORE COMPLEX THERE ARISES THE EVER-INCREASING NECESSITY THAT DECISIONS BE MADE ON AS PRECISE AN ANALYSIS OF THE RELEVANT FACTORS AS IS POSSIBLE, AND SUCH ANALYSES CAN NEITHER BE MADE NOR INTERPRETED BY THE UNTRAINED. AS MARKETS CONTINUE TO EXPAND IN SCOPE, THIS ABILITY TO ANALYZE AND INTERPRET CANNOT BE LIMITED TO DOMESTIC CONCERNS, FOR THE BUSINESSMAN OF TOMORROW WILL HAVE TO UNDERSTAND THE WORLD AS WELL AS HIS PREDECESSOR COMPREHENDED HIS LOCAL COMMUNITY.

IT IS A MISTAKE TO ASSUME THAT BUSINESS EDUCATION IS SOLELY THE CONCERN OF LARGE UNIVERSITIES AND COLLEGES, AND IN ORDER TO ARRIVE AT WHAT OUGHT TO BE DONE, IT IS IMPORTANT TO KNOW WHAT IS NOW BEING DONE AND FOR WHOM AND BY WHOM. WHILE NO ABSOLUTE CLASSIFICATION SCHEME OF THE PRESENT EDUCATIONAL ACTIVITIES IN THIS AREA CAN BE DEvised, A REASONABLY WORKABLE SUMMARY CAN BE PRESENTED UNDER FIVE GENERAL CATEGORIES.

I. COMPANY UNIVERSITIES

MOST OF THE LARGER CORPORATIONS IN THE UNITED STATES NOW OPERATE EXTENSIVE BUSINESS EDUCATION AND TRAINING PROGRAMS FOR THEIR OWN EMPLOYEES. SOME INDEED, HAVE LABELED THESE "COMPANY UNIVERSITIES," BUT ASIDE FROM THE DESIGNATION THE

PURPOSE IS CLEAR AND RESTS ON THE ASSUMPTION THAT THE BUSINESS EXECUTIVE OF TODAY MUST CONTINUE HIS EDUCATION IF HE IS TO REMAIN ABREAST OF THE DYNAMICS OF THE ECONOMY AND HIS PARTICULAR PLACE IN IT. THESE PROGRAMS, FURTHER, ACKNOWLEDGE THAT TRAINING IS ESSENTIALLY THE JOB OF INDUSTRY ITSELF AND THAT EDUCATION IN ITS BROADEST SENSE, IS THE PURPOSE OF INSTITUTIONS OF HIGHER LEARNING. INDUSTRY HAS COME TO REALIZE THAT IT CANNOT EXPECT UNIVERSITIES AND COLLEGES TO PROVIDE THE YOUNG EXECUTIVE WITH ALL OF THE KNOWLEDGE AND SKILLS WHICH HE WILL NEED IN PERPETUITY. THE TEACHING OF PARTICULAR SKILLS IS THE RESPONSIBILITY OF THE COMPANY, AND IT IS A RESPONSIBILITY WHICH THE COMPANY SHOULD NOT EXPECT THE COLLEGES OR UNIVERSITIES TO ASSUME. THESE PROGRAMS ARE SENSIBLE IN STILL ANOTHER WAY IN THAT IT IS RECOGNIZED THAT INDIVIDUALS LEARN BEST WHEN CONFRONTED BY A PROBLEM WHICH THEY NEED TO SOLVE. FURTHERMORE, CERTAIN KINDS OF LEARNING SIMPLY CANNOT TAKE PLACE UNTIL THE STUDENT HAS HAD SOME EXPERIENCE WHICH WILL MAKE THE LEARNING MEANINGFUL. THESE, IN BRIEF, ARE THE ASSUMPTIONS AND INTENTIONS OF THE COMPANY PROGRAMS. IT SEEMS LIKELY THAT IN THE FUTURE THEY WILL EXPAND IN SCOPE AND IN THE RANGE OF SUBJECT MATTER TREATED. AND IF THIS EXPANSION IS WELL CONSIDERED, IT WILL CONSTITUTE A REAL CONTRIBUTION TOWARD THE EDUCATION OF TOMORROW'S BUSINESSMAN.

II. COMMUNITY COLLEGES

THE JUNIOR OR COMMUNITY COLLEGES ALSO HAVE AN IMPORTANT ROLE TO PLAY IN EDUCATION FOR BUSINESS, PARTICULARLY IN THEIR TERMINAL, OR TWO-YEAR PROGRAMS. IN A CONCENTRATED COURSE OF THIS SORT EMPHASIS MOST HAPPILY CAN BE PLACED ON TECHNICAL OR SKILLS CURRICULA, AND IT IS HERE THAT BUSINESS OR INDUSTRY MAY IN THE FUTURE FIND ITS BEST POSSIBLE SOURCE OF TECHNICIANS.

III. SCHOOLS OF ENGINEERING

WITH THE ADVENT IN MANY BUSINESSES OF THE MARRIAGE OF ENGINEERING AND MANAGEMENT, OUR SCHOOLS OF ENGINEERING ALSO HAVE A ROLE TO PLAY IN EDUCATION FOR BUSINESS. THERE IS EVIDENCE THAT IN THE FUTURE, IN AT LEAST CERTAIN INDUSTRIES, ENGINEERING SCHOOLS THROUGH PROGRAMS IN INDUSTRIAL ENGINEERING AND INDUSTRIAL MANAGEMENT MAY

FIND THEIR PRESENT ROLES GREATLY EXPANDED IN BOTH SCOPE AND SIGNIFICANCE.

IV. LIBERAL ARTS COLLEGES

ALTHOUGH RECRUITING PRACTICES OF THE PAST DECADE WOULD ARGUE OTHERWISE, THERE IS EVIDENCE THAT BUSINESS IS TURNING TO THE LIBERAL ARTS COLLEGES WITH RENEWED INTEREST. IN RETURN MANY OF THESE COLLEGES ARE OFFERING COURSES IN THE FIELD OF BUSINESS. SOME FOUR HUNDRED OF THESE CAN NOW BE DESIGNATED AS FALLING IN THIS CATEGORY.

V. UNIVERSITY SCHOOLS OF BUSINESS

FINALLY WE COME TO THE BUSINESS SCHOOLS LOCATED WITHIN COMPLEX UNIVERSITIES. INsofar AS EDUCATION FOR BUSINESS IS CONCERNED THESE SHOULD STAND AT THE APEX, PROVIDING LEADERSHIP, GUIDANCE AND EXPERIMENTATION FOR ALL OF BUSINESS EDUCATION. THE BUSINESS SCHOOL RECOGNIZES THAT IT SHOULD LEAVE THE TEACHING OF SKILLS AND TECHNIQUES TO THE "COMPANY UNIVERSITIES" AND THE COMMUNITY COLLEGES. IN THIS CONNECTION IT ALSO RECOGNIZES INDUSTRIAL MANAGEMENT AS PROPERLY THE CONCERN OF SCHOOLS OF ENGINEERING. UNLESS THE BUSINESS SCHOOL CAN ASSUME THIS POSITION OF LEADERSHIP AND AVOID THE PITFALLS OF NARROW TECHNICAL TRAINING, IT DOES IN FACT, HAVE LITTLE EXCUSE FOR EXISTENCE.

CLOSELY RELATED TO THIS DESCRIPTION OF THE VARIOUS TYPES OF INSTITUTIONS ENGAGED IN EDUCATION FOR BUSINESS ARE THE APPROACHES TO THE PROBLEM NOW CHARACTERISTIC OF BUSINESS EDUCATION AS A WHOLE. GENERALLY SPEAKING THESE ARE THREE IN NUMBER. SOME INSTITUTIONS CONCENTRATE ALMOST EXCLUSIVELY ON THE TEACHING OF TECHNIQUES AND SKILLS, AND AS THE COMPLEXITY OF THE BUSINESS COMMUNITY INCREASES, SOME OF THESE TECHNIQUES BECOME VERY INVOLVED INDEED. TRAINING A STUDENT TO PROGRAM FOR A COMPUTER IS A FAR CRY FROM YESTERDAY'S TEACHING OF BOOKKEEPING, BUT THESE TECHNIQUES ARE NEEDED AND THEY ARE NEEDED AT VARIOUS LEVELS. OBVIOUSLY THEY MUST CONTINUE TO BE TAUGHT BY SOMEONE.

A SECOND APPROACH IS TO TREAT THE FIELD OF BUSINESS EDUCATION AS A SELF-CONTAINED SUBJECT. WHILE THE LIBERAL ARTS ARE JUDGED IMPORTANT BY ADVOCATES OF

THIS APPROACH, THEY ARE USUALLY SEPARATED FROM THE BUSINESS CURRICULUM ALTOGETHER. THE STUDENT IS GIVEN A FAIRLY THICK LAYER OF GENERAL EDUCATION, UPON WHICH IS IMPOSED A YEAR OR MORE OF BUSINESS SPECIALIZATION. THIS APPROACH IS CHARACTERIZED BY ITS RELATIVELY FUTILE ATTEMPT TO RELATE THE GENERAL AND THE SPECIAL.

FINALLY THERE ARE ATTEMPTS TO INCLUDE INTEREST IN BUSINESS AS PART OF GENERAL EDUCATION ITSELF. IMPLICIT IN THIS APPROACH IS THE RECOGNITION THAT PROBLEMS IN BUSINESS ARE OFTENTIMES NO DIFFERENT THAN PROBLEMS IN OTHER FIELDS OF ENDEAVOR AND THAT THE PRINCIPLES LEARNED IN THE STUDY OF THE LIBERAL ARTS AND SCIENCES ARE MANY TIMES APPLICABLE TO THEIR SOLUTION.

WITH THIS GENERAL SUMMARY OF PRESENT PRACTICES AND PROGRAMS, ATTENTION MAY NOW WELL BE TURNED TO THE KINDS OF KNOWLEDGE AND SKILLS WHICH THE PRODUCT OF AN UNDERGRADUATE PROGRAM SHOULD HAVE AS HE ENTERS THE BUSINESS COMMUNITY. INVOLVED HERE ARE SEVERAL THINGS OF IMPORTANCE. CERTAINLY IT IS VITAL THAT THE YOUNG BUSINESSMAN UNDERSTAND THOROUGHLY THE NATURE OF THE SOCIETY IN WHICH HE LIVES. HERE WE HAVE AN EXAMPLE OF WHAT MIGHT BE CALLED THE REINFORCING DEMANDS OF THE SEVERAL OUTCOMES OF AN UNDERGRADUATE EDUCATION, FOR CERTAINLY AS THIS IS OF PRIME IMPORTANCE TO THE BUSINESSMAN AS BUSINESSMAN, IT IS EVEN MORE IMPORTANT TO THE BUSINESSMAN AS CITIZEN. THE YOUNG EXECUTIVE OF THE FUTURE CANNOT BE TRAPPED, AS TOO MANY HAVE IN THE PAST, BY THE RESTRICTIONS OF TIME AND SPACE. HE MUST KNOW THE HISTORY OF HIS SOCIETY AND THE PRINCIPLES OF SOCIAL CHANGE. OTHERWISE HIS THINKING WILL BECOME STATIC IN A SITUATION WHERE ONLY FLEXIBILITY AND DYNAMISM CAN LONG BE EFFECTIVE. IT FOLLOWS THAT THE ASPIRANT BUSINESSMAN SHOULD FIND IN HIS UNDERGRADUATE PROGRAM HEAVY COMPONENTS OF THE BASIC SOCIAL SCIENCES AS WELL AS HISTORY. TO CONCENTRATE SOLELY ON ECONOMICS IS TO NEGLECT THE FACT THAT BUSINESS HAS IN ADDITION TO ITS ECONOMIC ASPECTS, SOCIAL, POLITICAL, PSYCHOLOGICAL AND HISTORICAL DIMENSIONS.

IT IS ALSO EVIDENT THAT NOTHING WILL BE MORE HELPFUL TO THE MAN ENTERING THE BUSINESS WORLD THAN THE ABILITY TO REASON. HIS FORMAL EDUCATION SHOULD

THEREFORE BE MARKED BY A REAL EMPHASIS ON THOSE DISCIPLINES DESIGNED TO PRODUCE THIS END. ALTHOUGH MATHEMATICS IS FREQUENTLY ASSIGNED A HEAVY RESPONSIBILITY IN THE DEVELOPMENT OF THESE RATIONAL CAPACITIES, CERTAINLY IT IS NOT THE ONLY DISCIPLINE INVOLVED. CRITICAL INQUISITIVENESS, A SENSE OF TOLERATION AND AN ORDERED CAPACITY FOR REASON ARE ENCOURAGED AS MUCH BY A STUDY OF LITERATURE OR LOGIC AS ARE THEY BY PURE MATHEMATICS. THE TRUTH OF THE MATTER IS, OF COURSE, THAT WE CANNOT CONCLUSIVELY PREDICT JUST HOW THE MAXIMUM EFFECTIVENESS IN REASONING CAN BE TAUGHT, BUT CERTAINLY IT CAN BE EXPECTED AS AN OUTCOME OF THOSE DISCIPLINES WHICH ARE RIGOROUS AND DEMANDING.

JUST AS THE BUSINESSMAN MUST HAVE SOME UNDERSTANDING OF THE NATURE OF SOCIETY AND THE ABILITY TO REASON AND MAKE VALUE JUDGMENTS, SO MUST HE BE AWARE OF THE NATURAL UNIVERSE AND THE ATTEMPTS TO UNDERSTAND IT. OBVIOUSLY CALLED FOR HERE IS CONSIDERABLE EXPOSURE TO THE NATURAL SCIENCES, BUT HOPEFULLY WITH AN EMPHASIS ON SCIENCE AS AN INTELLECTUAL PROCESS RATHER THAN SCIENCE AS A MANIPULATIVE TECHNIQUE.

ONLY AFTER THESE OBJECTIVES HAVE BEEN ACHIEVED OR AT LEAST APPROXIMATED SHOULD THE UNIVERSITY CONCERN ITSELF WITH THE SPECIFIC EDUCATION NECESSARY FOR ENTRANCE INTO THE BUSINESS COMMUNITY. IN ORDER TO BE OF SOME IMMEDIATE USEFULNESS TO THE HIRING CORPORATION OR BUSINESS ENTERPRISE, THE STUDENT SHOULD COME TO IT WITH WHAT MIGHT WELL BE DESCRIBED AS A SMALL, ANALYTICAL TOOL KIT. THE COMPONENTS OF THIS, THE BASIC MANAGERIAL TOOLS, WOULD INVOLVE COMPETENCE OF A LIMITED SORT AND SCOPE IN THE BEHAVIORIAL SCIENCES, ECONOMIC ANALYSIS AND QUANTITATIVE METHODS.

SO LITTLE OF THE ABOVE IS CONCERNED WITH BUSINESS COURSES, AS ORDINARILY CONSTRUED, THAT ONE MIGHT WELL RAISE THE QUESTION AS TO WHY ANY COURSES IN BUSINESS SHOULD BE INCLUDED AT THE UNDERGRADUATE LEVEL. WOULD IT NOT BE WISER TO DEVOTE THE ENTIRE FOUR YEARS TO TEACHING STUDENTS OF BUSINESS HOW TO UNDERSTAND SOCIETY, TO REASON WELL, AND BE POSSESSED OF IMAGINATION AND CREATIVITY?

THE QUESTION IS, OF COURSE, NOT WITHOUT POINT, AND IF SOCIETY WERE WILLING TO SAY THAT THE MAN BEING EDUCATED FOR BUSINESS MIGHT SPEND FIVE OR SIX OR SEVEN YEARS AT IT, INSTEAD OF FOUR, THIS WOULD CERTAINLY BE THE BEST OF ALL POSSIBLE ANSWERS. UNFORTUNATELY, HOWEVER, SUCH IS NOT THE CASE AND IT SEEMS QUITE UNLIKELY THAT THE SEVERAL SOCIAL FORCES WHICH CONTROL SUCH DECISIONS WILL IN FUTURE EXPAND BUSINESS EDUCATION BEYOND ITS PRESENT FOUR YEAR PATTERN. THE CONSEQUENCES ARE THAT ONE MUST SANCTION A COMPROMISE IN WHICH PERHAPS SEVENTY PERCENT OF THE UNDERGRADUATE PROGRAM IS DEVOTED TO NON-PROFESSIONAL PURSUITS AND THIRTY PERCENT TO THE PROVISION OF THE INTRODUCTORY TOOLS OF MANAGEMENT.

EVEN WITH THOSE COURSES SPECIFICALLY DEVOTED TO EDUCATION FOR BUSINESS, CARE SHOULD BE EXERCISED THAT ATTENTION IS NOT GIVEN TO DETAILS AND APPLICATIONS WHICH CAN FAR BETTER BE LEARNED ON THE JOB. THERE HAS BEEN A TENDENCY IN SOME QUARTERS TO PURSUE, IN THE NAME OF PRACTICALITY, COURSES WHICH IN THE LONG RUN ARE MOST IMPRACTICAL. SPECIFIC BUSINESS PRACTICES CHANGE AND CHANGE WITH RAPIDITY. AN UNDERSTANDING OF THE PRINCIPLES WHICH UNDERLIE THESE CHANGES IS FAR MORE IMPORTANT THAN SKILL AT EXERCISING THE PRACTICES THEMSELVES.

ONE OF THE QUESTIONS WHICH INEVITABLY EMERGES IN A DISCUSSION OF THIS SORT IS WHETHER WHEN EDUCATING FOR BUSINESS THE MARKET FOR THE END PRODUCT IS THOUGHT OF AS BIG BUSINESS OR SMALL BUSINESS. RECOGNIZING THAT THESE TWO TERMS ARE ESSENTIALLY FUZZY, IT STILL WOULD APPEAR THAT THERE IS SOME DIFFERENCE IN THE KIND OF EDUCATIONAL PROGRAM NECESSARY FOR EACH. CERTAINLY BOTH ARE IMPORTANT, AND YET IT SEEMS UNLIKELY THAT A SINGLE INSTITUTION CAN SUCCESSFULLY EDUCATE ITS STUDENTS IN BUSINESS FOR BOTH LARGE AND SMALL ENTERPRISES. THERE WOULD SEEM TO BE SOME LOGIC IN HAVING A UNIVERSITY CONCENTRATE ON EDUCATION FOR THE LARGER BUSINESS ENTERPRISES AND LEAVING EDUCATION FOR THE SMALLER BUSINESSES TO SOME OF THE OTHER INSTITUTIONS DESCRIBED ABOVE. THIS OBSERVATION IS MADE WITHOUT ANY INTENTION OF DEPRECATING THE ROLE OF SMALL BUSINESS OR EDUCATION FOR IT, BUT SIMPLY AFTER OBSERVING THAT THE UNIVERSITY PROBABLY HAS AT ITS DISPOSAL MORE OF THE RESOURCES NECESSARY TO DO THE OTHER EDUCATIONAL TASK.

AS ONE CONTEMPLATES THE RIGOR OF THE INTELLECTUAL FARE HERE RECOMMENDED, ONE IS FACED WITH THE PROBLEM OF THE PREREQUISITE INTELLECTUAL ABILITY NECESSARY ON THE PART OF THE STUDENT TO UNDERTAKE IT. OBVIOUSLY THE BETTER THE ABILITY OF THE STUDENT, OTHER THINGS BEING EQUAL, THE BETTER WILL BE THE RESULT. IT IS EQUALLY CERTAIN THAT THERE IS AN ABILITY POINT BELOW WHICH A STUDENT CANNOT PROFIT FROM THE PROGRAM HERE ENVISIONED. THE PROBLEM REALLY BECOMES ONE OF DETERMINING THAT MINIMUM LEVEL, FINDING MEANS FOR MEASURING IT, AND THEN PROVIDING AN EDUCATIONAL SITUATION WHICH WILL CHALLENGE THE CAPACITIES OF THE RANGE OF ABILITIES OF STUDENTS ADMITTED TO THE PROGRAM. IN THE SELECTION OF STUDENTS, PROBABLY MORE THAN INTELLECTUAL ABILITY SHOULD BE CONSIDERED, FOR THE MORE SUCCESSFUL AND RESPONSIBLE BUSINESSMEN ARE CHARACTERIZED NOT ONLY BY A HIGH INTELLECTUAL LEVEL BUT ALSO BY SUCH TRAITS AS INITIATIVE, STRONG WILL, INDEPENDENCE OF THOUGHT AND INTELLECTUAL CURIOSITY. THE PROBLEM OF MEASURING THESE TRAITS IS ONE WHICH BY NO MEANS HAS AS YET BEEN SOLVED.

IT SHOULD BE OBSERVED THAT IN THE LAST ANALYSIS, THE UNDERGRADUATE PROGRAM HERE SET FORTH HAS AN EXTREMELY LARGE COMPONENT OF WHAT MIGHT BE DESIGNATED THE LIBERAL ARTS AND SCIENCES. WHILE THERE MAY BE DISAGREEMENT AS TO THE SIZE OF THIS ELEMENT THERE SEEMS TO BE LITTLE AS TO THE NECESSITY FOR ITS PRESENCE AND ITS IMPORTANCE IN THE EDUCATION OF PROSPECTIVE BUSINESSMEN. QUESTIONS HAVE BEEN RAISED, HOWEVER, AS TO THE ADEQUACY OF PRESENT PROGRAMS IN THE ARTS AND SCIENCES TO PERFORM THE FUNCTION HERE NEEDED. THE CHARGE MOST FREQUENTLY MADE AGAINST THE LIBERAL ARTS IS THEIR LACK OF RELEVANCY IN THE CONTEMPORARY WORLD. WHETHER THIS CRITICISM IS WARRANTED OR NOT, IT IS SUFFICIENTLY WIDE-SPREAD AS TO MERIT CONSIDERATION BY BOTH THOSE CONCERNED PRIMARILY WITH THE LIBERAL ARTS AND THOSE CONCERNED WITH EDUCATION FOR BUSINESS.

THE APPROACH TAKEN IN THIS SYNTHESIS IS THE PRODUCT OF THE THOUGHTS OF MANY MEN, AND HAS BEEN IN THE MAKING FOR SOME TIME. PERHAPS IT IS WELL SUMMARIZED BY DEAN BACH IN THE FOLLOWING WORDS IN HIS PAPER, "SOME OBSERVATIONS ON THE BUSINESS SCHOOL OF TOMORROW."

GIVEN THE CERTAINTY OF CHANGE AND THE UNCERTAINTY AS TO ITS DIRECTION AND OUTCOME, IT SEEMS TO ME CLEAR THAT WE MUST PLACE CENTRAL IMPORTANCE IN OUR UNIVERSITY TRAINING--FOR BUSINESS AS ELSEWHERE--ON STUDENTS' THOUGHT PROCESSES AND NOT ON PARTICULARIZED SUBJECT MATTER. IN SUCH A WORLD, SURELY ANYTHING WE CAN DO TO DEVELOP FLEXIBILITY OF MIND, OPENNESS AND RECEPTIVITY TO NEW AND CHANGING IDEAS, HABITUAL SKILLS IN LEARNING FOR ONE'S SELF, AND OTHER SUCH MENTAL CHARACTERISTICS MUST PROMISE MORE USE TO THE INDIVIDUAL AND TO SOCIETY OVER THE QUARTER CENTURY OF CHANGE AHEAD, THAN WOULD COMPARABLE ATTENTION TO DESCRIPTIVE INFORMATION ABOUT TODAY'S INSTITUTIONS AND TODAY'S BEST BUSINESS PRACTICE. IT SUGGESTS EQUALLY THAT INsofar AS WE BUILD IN ANALYTICAL TOOLS, WE MUST CONTINUALLY REACH FOR THOSE OF BROAD AND GENERAL APPLICABILITY, WITH EMPHASIS ON HOW TO USE THEM EFFECTIVELY IN WIDELY VARYING SITUATIONS, RATHER THAN ON DETAILED PARTICULAR SKILLS AND TECHNIQUES.

THE MEADOW BROOK SEMINARS ON HIGHER LEARNING

Sponsored by Michigan State University-Oakland

ENGINEERING SCIENCE

A Synthesis and Summary Prepared by Thomas H. Hamilton and
Durward B. Varner, Vice Presidents, Michigan State University

The attached summary reflects the general ideas advanced by five top engineering educators when asked to address themselves to this question:

"With your knowledge and experience in the field of engineering education, how would you organize a program in engineering science at this new institution to train engineers for the half century ahead of us?"

The panel members were:

Dr. Eric A. Walker, President, Pennsylvania State University

Dr. C. Richard Soderberg, Dean of Engineering, Massachusetts Institute of Technology

Dr. Lee A. DuBridge, President, California Institute of Technology

Dr. Newman Hall, Professor and Chairman of Mechanical Engineering, Yale University

Dr. Frederick E. Terman, Dean of Engineering, Stanford University

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Engineering

(A synthesis and summary prepared by Thomas H. Hamilton and
Durward B. Varner, Vice Presidents, Michigan State University.)

Throughout the land there seems to exist a considerable and probably healthy dissatisfaction with the present state of engineering education. This dissatisfaction is shared, to some degree, by all who are concerned with the enterprise of engineering education. It exists among its purveyors (the faculties), the consumers (the students) and the users of the ultimate product (industry and government).

Thoughtful and balanced men who give attention to this problem recognize clearly that there is no basis for assuming that this dissatisfaction stems either from the inadequacy of performance of our engineering schools in earlier days, nor for that matter even the nature of their activities at the present. Taken in the large, the record of our engineering schools has been remarkably good. But in a sense we have come to realize that certain characteristics of our immediate national and international future have now become known, and in the minds of those who recognize the direction in which we move it becomes clearer that while much of what is now being done in engineering education must continue, there needs to be added new dimensions if the challenge of that future is to be met with success.

Basically the problem that bedevils the engineering educator stems from the change in the nature of our society. Two phases of this change cause us to recognize the inadequacy of what now is being done. One of these involves the sheer size of the work with which the engineer must now attempt to cope. At the turn of the century the engineer was said to be assigned to a "job," and these were

in effect small affairs for the most part relatively easily managed and unencumbered by the complexities which emerge from enormity. But in 1958, the engineer finds himself assigned not to a job but a "project."¹ The "project" rather than being small and simple, typically will be characterized as very large and extremely complicated. The year 1900 could not even envision the kinds of engineering problems which it has already been necessary to solve in connection with such projects as the Dewline or the several guided missiles projects.

The second basic difference between 1900 and 1958, and these differences are by no means mutually exclusive, arises from the fact that these mid-twentieth century engineering undertakings require of the engineer a scope and range which were quite unnecessary for the engineer at the turn of the century. The engineer at the head of a multi-billion dollar project will find that he must have some knowledge of, and be able to communicate with, the practitioners of law, of finance, and of politics. Here, as many an engineer has learned to his considerable discomfort, blueprints and formulae prove unsatisfactory as media of communication. Thus it becomes clear that the engineer of the future must not only be infinitely more skilled in his own discipline, but he must be at least an adequate generalist in the disciplines related scientifically to his own as well as those liberal disciplines which permit him to understand something about the nature of the physical and social world and the human beings and their works with which that world is populated.

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It is recognized that in some quarters the term "project" has a bad odor, but here it will suffice to demonstrate the distinction in mind.

The truth of the matter is that we shall not be able to develop in any one individual the capacities to do all of the kinds of work which will be demanded in the total engineering process of the future. We are faced with the necessity of training not one but three types of engineering practitioners. Two of these types of educational programs we either now have or at least have planned. It is to the third area that an engineering school starting from the present and planning for the future should devote its attention.

Briefly put, the three kinds of engineering practitioners which will be needed can perhaps be described as the innovators and directors, the applicators and the technicians. Most of our present engineering schools are doing an adequate job of educating the middle group. These are the engineers who will take the ideas of others and design the machinery for implementation. Even these, however, will probably have to deal with applications involving much more sophisticated situations than has been customary in the past. At the lower level of the technician it is probable that we are not as yet completely tooled up educationally to produce these in the required abundance. But the plans that are common in many states to develop technical institutes in connection with community and junior colleges would seem to give promise that this problem is on its way to a solution.

It is education for the innovating and directing engineer of which we are now in such very short supply. Those few innovating engineers we now have seem to have arisen to their position in spite of the frustrations of educational programs designed essentially to make applicators of them. One of the most remarkable things about genius is that it seems almost impossible for even a bad education to frustrate it.

On one matter there seems to be rather clear agreement and this is that there are relatively few individuals equipped with the intellectual ability, the willingness to work, and the perseverance necessary to be educationally inducted into the innovating class. Here, perhaps, we come to our first principle, and this is that any institution which intends to devote itself either wholly or partially to the education of the innovating and directing engineer must restrict the students undertaking such a program to those of high intellectual ability who are possessed of a willingness to work and persevere. Just how high this intellectual ability must be is, of course, not known with any precision. Whether it is a program that can be undertaken only by the top 2 percent or by the top 10 is a matter on which wisdom will only grow from experience.

It is equally clear that the able students destined to undertake the kind of program here envisioned should be identified as early as possible, and from the moment of identification given special programs commensurate with their ability and designed to lead them in the desirable direction. Again there is no evidence that any man has been able to prescribe exactly the moment at which definitive identification and subsequent curricular segregation is possible. There seems to be agreement that this should take place at the very latest by the end of the sophomore year in the university, and imagination may develop ways of moving the date closer to the end of the secondary school experience.

If it be accepted that the most important role which a new and unsullied engineering school might undertake is the education of these innovators and directors, then, of course, the logical first question is of what should this education consist? Short of experience as we are, it is easier to demonstrate

what an education such as is here under discussion should not contain. Certainly this program should eschew any of the emphasis on vocationalism which has characterized too many engineering programs. This is probably true for all of engineering education, but it is particularly applicable in the present instance. The reasons for this are clear and simple once analysis is applied. To try to teach narrow technologies on the university campus is but to dabble in certain obsolescence. The rate of change within industry is such that inevitably the special vocational skills learned on a campus will be out of date by the time the student is in a position to apply them in practice. In view of this, industry has come to recognize that the problem of teaching the application, the art, is its province and not the university's. This is a kind of teaching that industry is much better prepared to undertake.

To state positively, however, of what the new curriculum should consist is more difficult. Perhaps the term "engineering science" best connotes what is here in mind even though the engineering profession has not as yet succeeded in spelling out in any sort of a definitive fashion all that is here involved. Certainly it means concern with basic principles as opposed to knowledge of the art of application.

A great deal of the difficulty in defining more clearly engineering science arises from the fact that it seems not to fit comfortably either of the two categories into which it is quite common to divide science. While all who have given more than the most superficial of consideration to the classification are convinced of its inadequacy, the fact remains that we tend to divide science into the pure and the applied. Pure science can be roughly defined as that kind of scientific endeavor the sole purpose of which is to understand phenomena. Applied science, on the

other hand, is interested in securing scientific information in order that it may be applied to utilitarian objectives.² The best thinking now would seem to indicate that engineering science is neither of these, some of both, and possibly something in addition. Beyond a recognition that engineering science must emphasize first principles of science and pay relatively little attention to the art of application in particular situations, there is little agreement on its precise content.

Certainly the leaders in the field of engineering education are agreed that in addition to replacing present courses in engineering with experiences in the engineering sciences, there must also be given a great deal more attention to those disciplines which undergird and buttress engineering. Particularly is this true of the natural sciences and mathematics. The engineering innovator of the future will have to be far better educated in physics and in chemistry and particularly in mathematics than has been true in the past. This is the case not only because his success as an engineering scientist will depend on his capacity to use these tools, but also to give him one aspect of the greater range and scope which was mentioned earlier.

A third phase of the education of the innovating engineer to which attention must be given is that which might be called liberal or general or social-humanistic. This is of prime importance to him professionally, for as has been suggested above, the type of engineer here being contemplated will have to be able to understand and communicate successfully with men in many other professions and

The difficulty with this classification of pure and applied science is that basically it depends on a knowledge of the subjective motivations of the scientist, the nature of which he may be unaware himself.

vocations if he is to successfully perform his task. Nor would it be wise to overlook the fact that the student will become a man and a citizen before he becomes an engineer, and his education as man and citizen should no more be neglected than his education as an engineer.

There remains, of course, the problem for one who would construct a program for the engineering scientist as to how much of the time should be devoted to these three phases of the total. Those schools which seem to have most closely approximated the curriculum here under discussion, devote approximately 20 percent of the student's time to the liberal, 35 percent to the scientific and mathematical, and 45 percent to engineering science. Some would contend that 40 percent of the time for engineering science and 30 percent for both the physical sciences and mathematics and liberal and general education would give greater promise of achieving the objectives in mind.

Questions have been raised as to whether it is possible, even with the brightest of students and the best of faculties, to achieve this three-faceted objective within four years. Some institutions have contended that it is not, and, as a result, have inaugurated five-year programs in the field of engineering. The consensus of opinion seems to be that this is not wise. Frequently extending to five years has simply meant a dilution of the program and the introduction of matters better left untaught. A wiser solution seems to be to recognize, first, as should be recognized with all undergraduate programs, that it is simply impossible in four years to teach everything that might be desirable, and, secondly, to recognize that for the engineers here under consideration some graduate work would seem almost essential with most of these engineering scientists continuing on to the level of the doctorate.

It already has been emphasized that a program in engineering science cannot possibly be undertaken by all of the students who elect to become engineers, but rather that it is a program which should be reserved only for the most able and the most diligent. But it is equally true that such a program can by no means be taught by all engineering faculties. Such a program as is now under discussion will require a faculty of the very highest quality -- the members of which themselves approximate at least some of the excellences desired in the students. This means that an institution undertaking such a program must provide salaries which will permit it to compete for the very ablest of engineering teachers. But this is not the whole, perhaps not even the heart, of the matter. Research opportunities and the chance to work with graduate students will weigh equally heavily with good engineering scholars as a means of inducement. While it is recognized that any new institution will have to concentrate its early attention on instruction, if engineering science is to be the motif, then from the beginning there must be envisioned both a graduate program and opportunities for research.

To some extent, an institution located in an area where many fine engineers are employed could rely on the services of some of these engineers on a part-time basis, if they are used to teach the areas in which they have great competence and not to compensate for a shortage of permanent staff. But there is no substitute for a core of full-time, permanent faculty members whose exclusive responsibility is the preservation, discovery, and transmission of knowledge of and about engineering science. It seems likely that the kinds of faculty members who would be most attracted to a new venture of this sort would be the extremely able young teachers and scholars who saw in the venture an opportunity to make a significant

contribution to the development of engineering scientists.

The approach which has here been taken, it must be emphasized, is only partial. It would be wrong to suggest that all schools of engineering should so concentrate their efforts, for not only has it been pointed out that only a few can qualify intellectually for this kind of program, but, moreover, the future will still be characterized by great needs for the other two types of engineering practitioners earlier described. These, too, must be appropriately educated and trained.

It is true that the development of this kind of an engineering science curriculum poses problems for a state university. In the first place, it demands a degree of selectivity for the engineering curriculum which is sometimes not characteristic of a public university; but perhaps the time has come when the public is willing to recognize that while it must provide higher educational opportunities for great masses of students, it also, if the public is to remain healthy, must provide special kinds of opportunities for the unusually able.

It seems doubtful that an institution which considered itself only regional in terms of a service area could well embark on this curriculum, for in order to procure a sufficient number of talented students only an entire state or a region of several states or indeed the nation provides an adequate reservoir of student talent.

One would speculate with a new institution as to what kind of an organization should be contemplated. Those of long experience in existing institutions are aware of how often the division of the university into colleges, and subsequently into departments, stands in the way of the integration of disciplines which now seems so necessary to educational progress. No one has really examined the possibility of operating a university without either college or departmental

organizations whether they be under these names or not. And it is a matter to which thought should be given. Perhaps by the very nature of a social institution some functional organization is necessary, but certainly it would be well when developing a new institution to avoid the rigidity and intellectual provincialism which unfortunately characterizes the present organization of too many institutions of higher learning. In engineering, for example, there might be some merit in refusing to impose the current departmental organizational pattern on a new school and, instead, organizing both the curriculum and the administration of the school around such concepts as materials, energy, and man.

One hundred years ago engineers invented things that scientists did not understand. The steam engine, far from being based on previously completely known scientific principles, raised questions which subsequently the scientists had to answer. Today the situation is reversed. Invention and innovation will be the product only of those who are firmly grounded in the sciences. Beyond the level of the gadget, the bright intuitionist with a mechanical bent will make few major contributions in the century ahead. We must depend for our engineering progress on extremely able men who are well educated liberally, scientifically, mathematically, and as engineering scientists.

APPENDIX 7

The Michigan State University faculty members who were on the most recent MSUO curriculum committee are as follows:

Carl D. Mead
Professor, Department of English

Wilbur E. Deskins
Assistant Professor, Department of Mathematics

Edward B. Blackman
Professor and Head, Department of Communication Skills

Cole S. Brembeck
Professor and Head, Department of Foundations of Education

Thomas A. Staudt
Professor and Head, Department of Marketing and Transportation Administration

Lawrence W. Von Tersch
Head, Department of Electrical Engineering

Stanley J. Idzerda
Director of the Honors College

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President

Harold A. Fitzgerald
Publisher, The Pontiac Press
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Vice President & Chairman Finance Comm.

Don E. Ahrens
Retired General Manager Cadillac
Division, General Motors

Vice President & Chairman Community

Relations Committee
Paul K. Cousino
Superintendent
Warren Consolidated Schools
Warren, Michigan

Vice President & Chairman Continuing Education Committee

Mrs. William T. Gossett
Bloomfield Hills, Michigan

Vice President & Chairman Program

Development Committee
James C. Zeder
Vice President, Chrysler Corporation
Detroit, Michigan

Secretary

Dana P. Whitmer
Superintendent, Pontiac Public Schools
Pontiac, Michigan

Treasurer

Alfred C. Girard
President, Community National Bank
Pontiac, Michigan

Judge Clark J. Adams
Oakland County Circuit Judge
Pontiac, Michigan

Donald C. Baldwin
Superintendent
Rochester Community Schools
Rochester, Michigan

Christian F. Beukema
President, Michigan Limestone Division
United States Steel Corporation
Detroit, Michigan

John B. Bruff
Attorney
Mt. Clemens, Michigan

Judge Howard R. Carroll
Macomb County Circuit Judge
Mt. Clemens, Michigan

Mrs. L. L. Colbert
Bloomfield Hills, Michigan

Keith Crissman
President, Crissman Chevrolet Company
Rochester, Michigan

Robert Doen
Macomb County C.I.O. Council
East Detroit, Michigan

Major General Robert E. L. Eaton
Commander, Tenth Air Force
Selfridge Field, Michigan

Coy G. Eklund
Agency Manager
Equitable Life Assurance Company
Detroit, Michigan

William J. Emerson
Superintendent, Oakland County Schools
Pontiac, Michigan

E. F. Fisher
President, Garwood Industries
Detroit, Michigan

Miss Marion Goodale
Headmistress, Kingswood School Cranbrook
Bloomfield Hills, Michigan

John F. Gordon
President, General Motors Corporation
Detroit, Michigan

Fred V. Haggard
President, Oakland County C.I.O. Council
Pontiac, Michigan

Delos Hamlin
Chairman
Oakland County Board of Supervisors
Farmington, Michigan

John A. Hannah
President, Michigan State University
East Lansing, Michigan

Bert Henson
Finance Secretary, Local 653, U.A.W.
Pontiac, Michigan

George J. Heubner, Jr.
Executive Engineer
Research Engineering Division
Chrysler Corporation
Detroit, Michigan

Ernest A. Jones
President, MacManus, John & Adams
Bloomfield Hills, Michigan

Miss Sarah VanHoosen Jones
Former Member State Board of Agriculture
Rochester, Michigan

Bernard A. Kalahar
Chairman
Macomb County Board of Supervisors
Mt. Clemens, Michigan

Adolph F. Klein
President, The Wayne Oakland Bank
Royal Oak, Michigan

S. E. Knudsen
General Manager, Pontiac Motor Division
General Motors Corporation
Pontiac, Michigan

Mrs. Roger M. Kyes
Bloomfield Hills, Michigan

Harold E. LeFevre
Superintendent, Macomb County Schools
Mt. Clemens, Michigan

Howard L. McGregor, Jr.
President National Twist Drill & Tool
Rochester, Michigan

Paul W. McKee
Publisher, Monitor-Leader
Mt. Clemens, Michigan

Lynn S. Miller
Editor, Royal Oak Tribune
Royal Oak, Michigan

Mrs. Ralph T. Norvell
Pontiac, Michigan

Raymond T. Perring
President, Detroit Bank & Trust Company
Detroit, Michigan

Harry M. Pryale
President, Baldwin Rubber Company
Pontiac, Michigan

Thomas R. Reid
Director of Community Relations
Ford Motor Company
Dearborn, Michigan

Arthur Rowley
Richmond Township Supervisor
Richmond, Michigan

Louis H. Schimmel
President, Pontiac Board of Education
Detroit, Michigan

Ernest W. Seaholm
Retired Chief Engineer, Cadillac Division
General Motors Corporation
Birmingham, Michigan

Mrs. Edward Stark
City Supervisor of East Detroit
East Detroit, Michigan

D. B. Varner
Vice President, Michigan State University
East Lansing, Michigan

Mrs. R. Jamison Williams
Birmingham, Michigan

Walter K. Willman
Pontiac City Manager
Pontiac, Michigan

Mr. & Mrs. Alfred G. Wilson
Meadowbrook Farms
Rochester, Michigan

Harry L. Winston, Jr.
President, Oakland County Alumni Club
Birmingham, Michigan

Theodore O. Yntema
Vice President, Ford Motor Company
Dearborn, Michigan